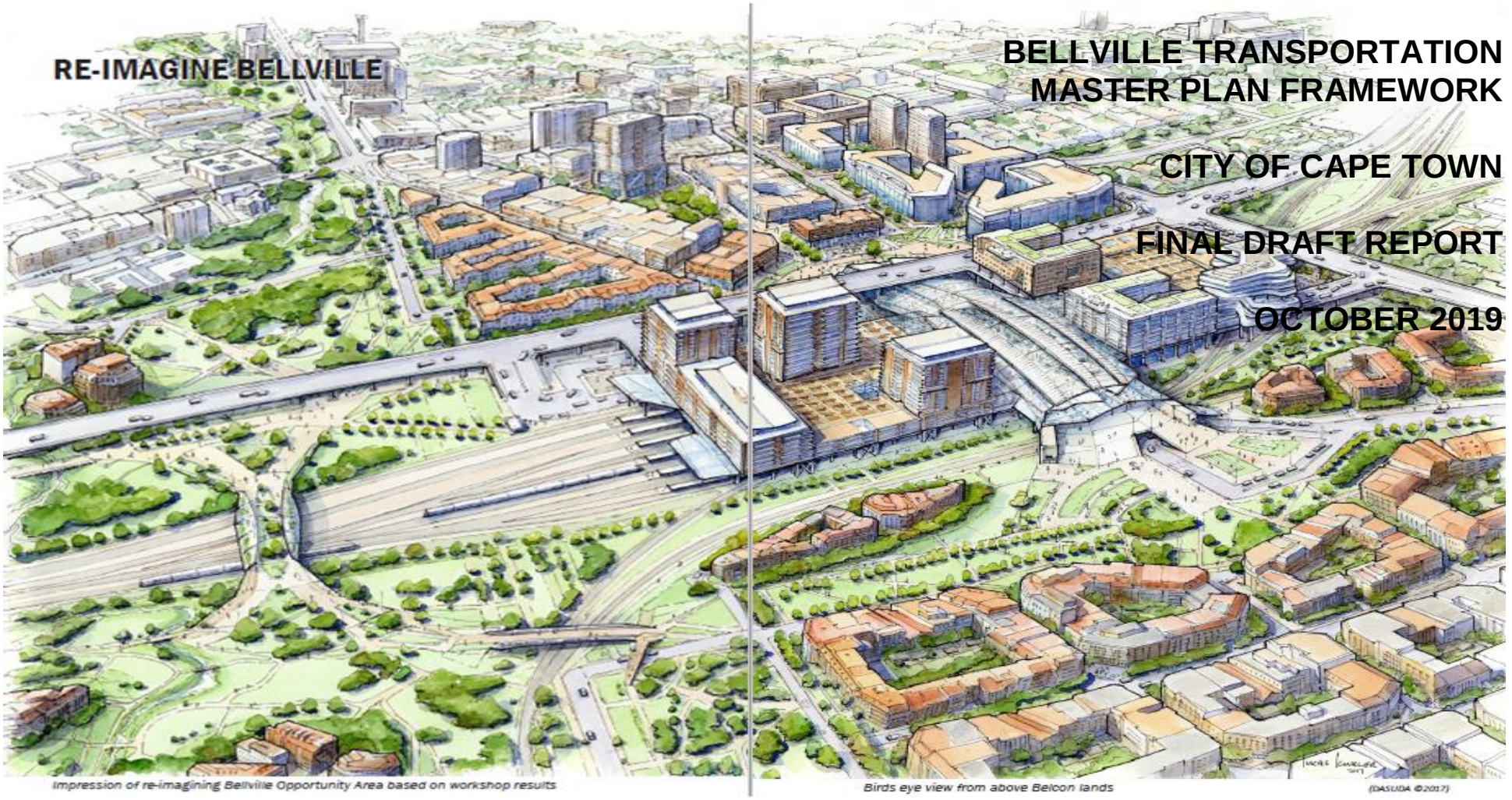


Impression of re-imagining Bellville Opportunity Area based on workshop results

Birds eye view from above Belcon lands

(DAS.UDA ©2017)

BELLVILLE TRANSPORTATION MASTER PLAN FRAMEWORK

CITY OF CAPE TOWN

FINAL DRAFT REPORT

OCTOBER 2019

headland town planners

CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

aurecon

Document control		aurecon				
Report title		Document title Bellville Transportation Master Plan Framework				
Document ID			**Project number**		113285	
File path						
Client		Client City of Cape Town				
Client contact		Mr Frank Cumming	**Client reference**			
Rev	**Date**	**Revision details/status**	**Author**	**Reviewer**	**Verifier** (if required)	**Approver**
0	26 July 2019	Preliminary Draft Report (Ver 1.0)	IS	EJR	JT	JT
1	15 August 2019	Draft Report	IS	EJR	JT	JT
2	28 October 2019	Final Draft Report	IS	EJR	JT	JT
Current revision		**2**				

Approval			
Author signature		Approver signature	
Name	I C Scott	Name	H J Taljaard
Title	Technical Specialist	Title	Associate

Document prepared by:

Aurecon South Africa (Pty) Ltd

Reg No 1977/003711/07

Aurecon Centre
1 Century City Drive
Waterford Precinct
Century City
Cape Town 7441

PO Box 494
Cape Town 8000
South Africa

T +27 21 526 9400
F +27 21 526 9500
E capetown@aurecongroup.com
W aurecongroup.com

LIST OF ABBREVIATIONS

BITLUP	Bellville Integrated Transport / Land Use Plan
BRT	Bus Rapid Transit
CBD	Central Business District
CCT	City of Cape Town
C-D	Collector-Distributor (roads)
CoCT	City of Cape Town
CPUT	Cape Provincial University of Technology
CTIA	Cape Town International Airport
Du/Ha	Dwelling Units per Hectare
E/W	East / West
GABS	Golden Arrow Bus Services (Pty) Ltd
GLA	Gross Leasable Area
IPTN	Integrated Public Transport Network
IRT	Integrated Rapid Transit
ITP	Integrated Transport Plan
LMS	Loading Management System
LRT	Light Rail Transit
MBT	Mini-Bus Taxi
MTIIF	Medium Term Infrastructure Investment Framework
N/S	North / South
NGO	Non-Governmental Organisation
NMT	Non-Motorised Transport
PFMA	Public Finance Management Act
PPH	Persons per Hectare
PPP	Public Private Partnership
PRASA	Passenger Rail Agency of South Africa
PT1	Public Transport Parking Zone 1
PT2	Public Transport Parking Zone 2
PTC	Public Transport Company
PTI	Public Transport Interchange
PTOD	Pragmatic Transit Oriented Development
TFR	Transnet Freight Rail
TOC	Taxi Operating Company
TOD	Transit Oriented Development
TVA	Tyger Valley Area
UGT	Urban Guided Transit
UWC	University of the Western Cape

Draft Report Core Team Endorsement

This report is the result of intensive collaboration between officials of the City of Cape Town Urban Catalytic Directorate and the Aurecon professional Team.

The **Conclusions and Recommendations contained in this report are fully endorsed by the Project Core Team** comprising the following members:

City of Cape Town
Mr Frank Cumming – Director, UCI
Mr Tony Vieira – Investment Specialist
Mr Anthony Damonze – Project Manager, UCI

Aurecon
Mr Ian Scott
Mr Jacques Taljaard
Mr EJ (Robby) Robertson (Sub-consultant)
Mr W Crous (Sub-consultant)

Executive Summary

Introduction

Historically Bellville has been subjected to several spatial and road structuring reviews. Despite these initiatives, very little progress has been made in advancing the resultant recommendations other than the preparation of a number of conceptual road proposal designs.

The current work intent is founded on the work previously completed and reported on in the Bellville Integrated Transport and Land Use Plan (March 2016), and its supplementary report TOD Opportunities Investigation for the Bellville Station Precinct (April 2016) as well as a City internal cross-departmental workshop entitled Accelerator Report: Bellville Opportunity Area, Workshop Minutes Report (March 2017).

Purpose of the Study

The City of Cape Town requires a review of all transportation planning associated with the Bellville CBD precinct. The intended outcome of the review is a synthesis of all planning proposals that have been considered to date and the formulation of a Bellville CBD Master Plan Framework (inclusive of a Transportation Framework) that will:

- be endorsed officially and politically;
- provide a degree of certainty regarding future road transport infrastructure provision;
- provide a more informed position on public transport service provision;
- inform infrastructure and public transport service provision implementation budgeting cycles, and
- provide a stable foundation upon which general development within the Bellville CBD precinct can be leveraged, by both the public and private sectors.

Envisaged Outcomes of the Study

The outcomes from the study were determined to be:

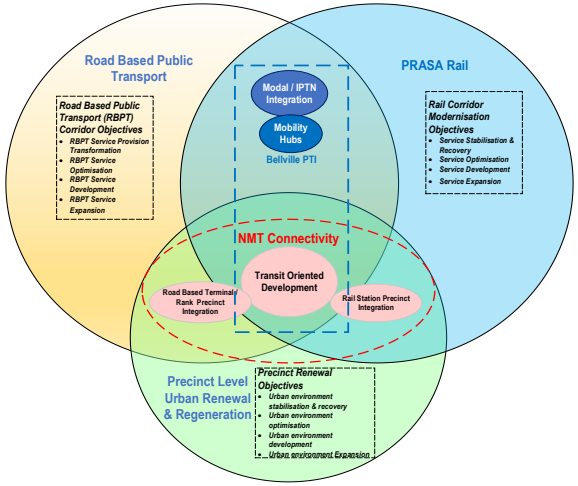
- a more in-depth and comprehensive understanding of the **end state land use** envisaged for the primary area which informed the core road proposal responses that would be supportive of a TOD development philosophy within the Bellville CBD core area;
- the identification of **a package of "core area road proposals"** that would significantly contribute to traffic reduction in, or redistribution from, the CBD core to facilitate a public transport / pedestrian-oriented environment supportive of Transit Orientated Development principles;
- the identification of **a package of "extended network road proposals"** that, while not directly impacting on the primary study area (the CBD Core), have broader regional ramifications for wider traffic distribution primarily associated with the secondary study area;
- understanding the **road based public transport IPTN delivery timelines**, interim road based public transport transformation intentions and responses including a better understanding of feeder and community services to support the primary and secondary study areas;
- a more comprehensive review of the **implications of a vertically integrated mobility interchange facility with Bellville Station** that is supportive of the integration of the land parcels to the north and south of the Bellville Station and that facilitates the release of land,

currently being used as a road based public transport terminal, for development purposes;

- the associated **road based public transport interchange support requirements** (transitional holding area / multi-modal depot responses), and
- the realization that the envisaged end state public transport passenger demand **may breach BRT capacity thresholds** necessitating a high-level consideration of a public transport technology step change (LRT).

CBD Master Plan Framework

The approach to the Study was guided by a consideration of three inter-dependent pillars that are deemed to be necessary if a successful regeneration of the Bellville CBD as the City of Cape Town's second economic node is to be realised and that is supportive of the densification intentions that contribute to the transformation into a spatially efficient and equitable city.



The three pillars are:

- Urban renewal and economic regeneration
- Road based public transport transformation, and
- Renewal of passenger rail services

The diagram alongside illustrates the inter-relatedness of the pillars.

The framework is premised on a planning and delivery prioritisation that places pedestrian and public transport considerations ahead of those of the private vehicle. This approach encompasses a complete street philosophical approach which places movement requirements and priorities within an overall context.

Application of the above frameworks highlighted that the **complexity of balancing** the "three pillars" of urban renewal, urban passenger rail renewal and modernisation and a transformed road based public transport system cannot be underestimated.

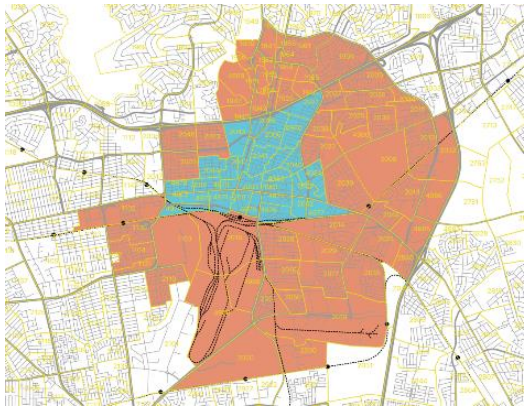
A considered appreciation of the time frames associated with the delivery progression associated with these pillars, individually and / or collectively, emphasises this complexity and the need for **clearly articulated roles, responsibilities and accountabilities** to enable appropriate delivery of a renewed and vibrant CBD over the long term.

Central to any form of successful delivery is **institutional collaboration**, across all spheres of government as well as with State Owned Companies / Entities, enabling integrated planning and delivery co-ordination that will, of necessity, span an extended period of time.

Study Areas

Two study areas are defined:

- a core area focused on the Bellville CBD area centered around the Bellville Railway Station and current / proposed PTI locations (Primary – Blue), and
- that required to confirm the system level transport demand, road proposals and public transport responses (Secondary – Orange).



Study Informants

Three key informants are pertinent:

- **Land use scenarios** – inclusive of current known development intentions within the two study areas as well as a consideration of the City's practical transit oriented densification policy intentions;
- Broader **transportation system road network** (classification, cross-section) and public transport responses, and
- A detailed understanding of the **interchange movement system requirements** at a core (1km radius) precinct level around the Bellville railway station and envisaged Public Transport Interchange (PTI) location.

Land Use Assumptions

A fundamental understanding of the land uses, and associated activities, is essential for determining, *inter alia,* the associated movement patterns that are generated as a result of these activities. This understanding, in turn, informs and guides transportation responses that are required to support the economic activity embedded in the land uses envisaged.

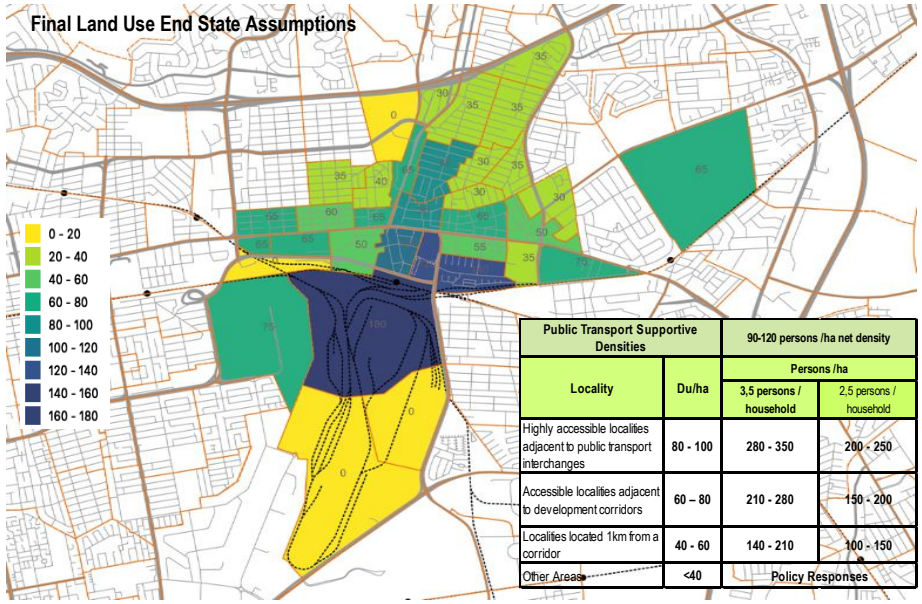
The City's IPTN Land Use Model consists of three different **land use scenarios**, of which the **Pragmatic transit-orientated development (PTOD)** was used as the baseline data for the purposes of this study.

In general, the PTOD Model scenario proposed lower likely densities for the proposed study areas due to the fact that the model does not account for recent development intentions that have been indicated for the study areas.

Although Cape Town has very low relative densities across the metropolitan region, it is a well-established imperative throughout the world, and in all of Cape Town's planning and development strategies and policies, that much higher residential densities are needed.

Consequently, and jointly with the City's land use officials, the PTOD Land Use Model was modified based on certain development assumptions that were known to the team at the start of the project process.

In addition, through the various discussions with City officials, stakeholders and other members of the project team, a long term "end state" optimal density for each transport zone was identified and endorsed for the purposes of the model which is summarized graphically alongside.



Public Transport Supportive Densities		90-120 persons /ha net density	
		Persons /ha	
Locality	Du/ha	3,5 persons / household	2,5 persons / household
Highly accessible localities adjacent to public transport interchanges	80 - 100	280 - 350	200 - 250
Accessible localities adjacent to development corridors	60 – 80	210 - 280	150 - 200
Localities located 1km from a corridor	40 - 60	140 - 210	100 - 150
Other Areas	<40	Policy Responses	

Land Use and Public Transport

Land Use density has a marked effect on public transport policy responses required as well as on the economic effectiveness of public transport services that are provided. Conversely, without public transport being present, there is little prospect of urban densification and meaningful corridor development materialising.

The resultant levels of public transport demand also inform the appropriateness of different public transport technology responses.

Generally, net densities of between 90-120 persons per hectare (or gross densities of 30-40 persons per hectare)[1] are felt, internationally, to provide a density level that provides a reasonable base of public transport ridership support.

Densities that are less than this level would require clearly stated public transport provision policy responses (e.g. service frequency per hour, hours of operation), that can change as densification levels change. Given the lower density levels that would apply to peri-urban and rural contexts as well, such a public transport policy response would also have merit.

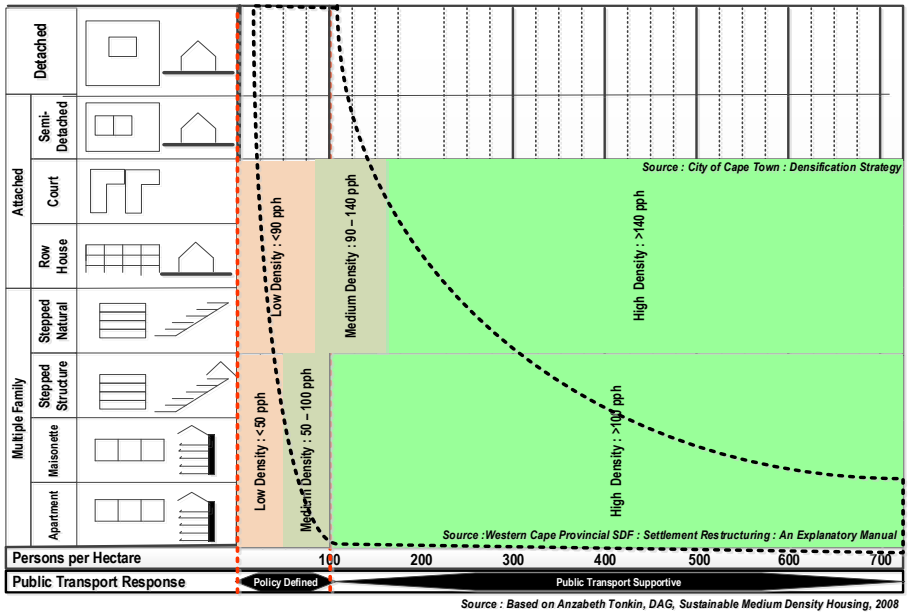
For simplicity, four density ranges can be framed that relate to the "accessibility" requirements of particular urban locations:

- highly accessible localities adjacent to public transport interchanges should be between 80-100du/ha (200pph - 250pph with an average household size of 2,5 persons / ha),
- Accessible localities adjacent to development corridors should be between 60-80 du/ha (150pph – 200pph),
- Within localities located 1 km walking distance from a corridor should be between 40-60 du/ha (100 – 150pph), and within localities (with densities <40 du /ha (<100pph), which require specified public transport policy responses (hourly frequencies, hours of operation) to support feeder services to nearby corridors and / or local or community services providing community access to community facilities (clinics, libraries, government facilities). Sight should not be lost of the fact that these services also provide access to domestic employees, who are often neglected in any consideration of public transport provision.

The assumed household size of 2,5 is in line with the current household size decline trajectory which has moved from 3,5 to 3,17 very rapidly.

[1] DOT, Integrated Urban Corridor Assessment and Strategy Development, 2001

The figure below reflects density, housing typologies and public transport policy intervention thresholds, and highlights the importance of a policy response where urban densities are low, and that the rate of densification can be strongly supported by the availability of public transport, emphasising the need for early public transport policy responses to be adopted.



Source : Based on Anzabeth Tonkin, DAG, Sustainable Medium Density Housing, 2008

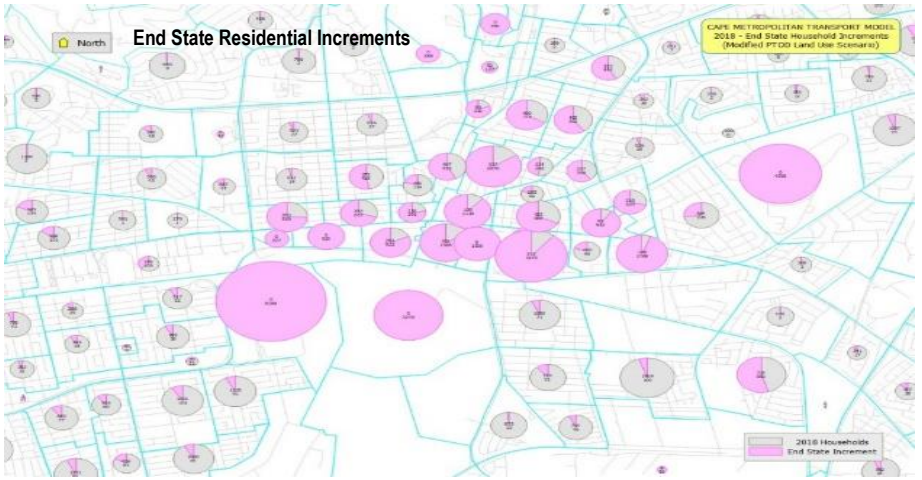
Macro-Modelling Outcomes

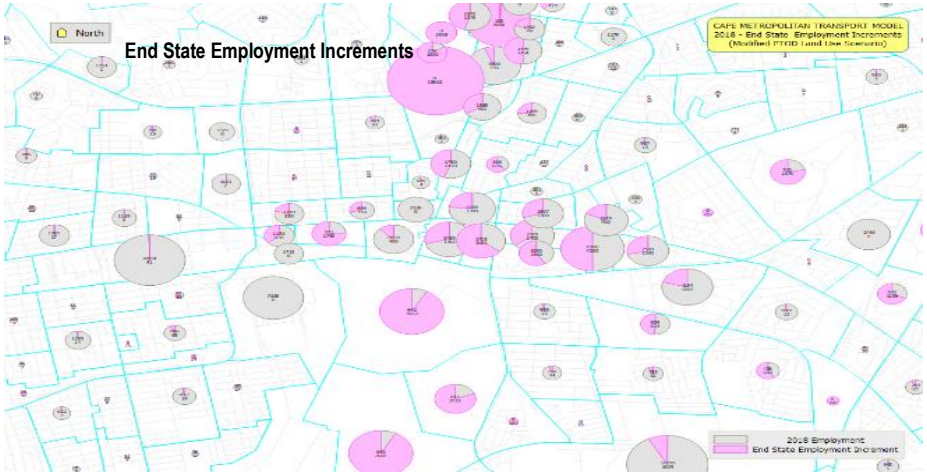
Productions and Attractions

The figures below provide a summary of the trip productions and attractions for the End State Land Use which are included for the metropole in the EMME model, and also for the primary area, the latter based on the assumptions described above.

The residential productions and the employment attractions land use increments between 2018 (grey) and the End State (purple) are reflected in the diagrams below.

The outcome for both residential densification and employment intensification are clearly reflected.





Due to the nature of the high density, mixed use development proposals, the model estimated that about 30% of Bellville's residents could be working locally in the study area. This is clearly visible in the figure below.

Modal Split

Noting that the model results are based upon assumptions around the provision of a vastly expanded and improved metropolitan, as well as primary and secondary area public transport systems, the modal split outcome for the End State reflects marked differences with the 2018 situation. The table below summarises this peak period person-trip comparison.

These results indicate a near fivefold increase in peak period trip productions and a 54% increase in attractions. In both instances the model predicts large shifts from car usage to public transport, while non-motorised travel also remains high. Figures of this magnitude obviously have significant implications for the future transport situation in and around Bellville. Applying a generally accepted "peak hour factor" to the above peak period numbers indicates the envisaged the peak hour person trip outcomes.

	2018 Modal Split Results (AM Peak Period Commuters- person trips						
	Car	%	Public Transport	%	NMT	%	Total
Productions	6,566	73,6	871	9.8	1,486	16,6	8,922
Attractions	23,774	56,3	16,481	39.0	1,985	4,7	42,240
	End State Modal Split Results (AM Peak Period Commuters - person trips						
	Car	%	Public Transport	%	NMT	%	Total
Productions	12,768	31,8	22,338	55,7	5,023	12,5	40,130
Attractions	31,946	49,2	27,967	43,1	5,021	7,7	65,935
	End State Modal Split Results (AM Peak Hour Commuters - person trips						
(0.6 Peak Hour Factor Application)	Car	%	Public Transport	%	NMT	%	Total
Productions	7,661	31,8	13,403	55,7	3,014	12,5	24,078
Attractions	19,168	49,2	16,780	43,1	3,013	7,7	39,561

Macro Model Application

Once the base year calibration/ verification exercise had been completed, the present road network was updated to include the recently completed N1 capacity improvements (additional lanes between Jip De Jager Drive and Old Oak interchanges).

This modified network then formed the basis for a series of scenario tests with local and regional network improvements, which were identified as potential catalysts for the development of Bellville.

These projects have been grouped into two main categories as follows:

A Core Area Road Proposals

B Extended Network Road Proposals

A - Core Area Road Proposals

These proposals are located primarily within the primary study area to unlock its development potential. It is also anticipated that these projects will improve the road network operational performance within the Bellville CBD area to facilitate a more pedestrian and public transport friendly environment.

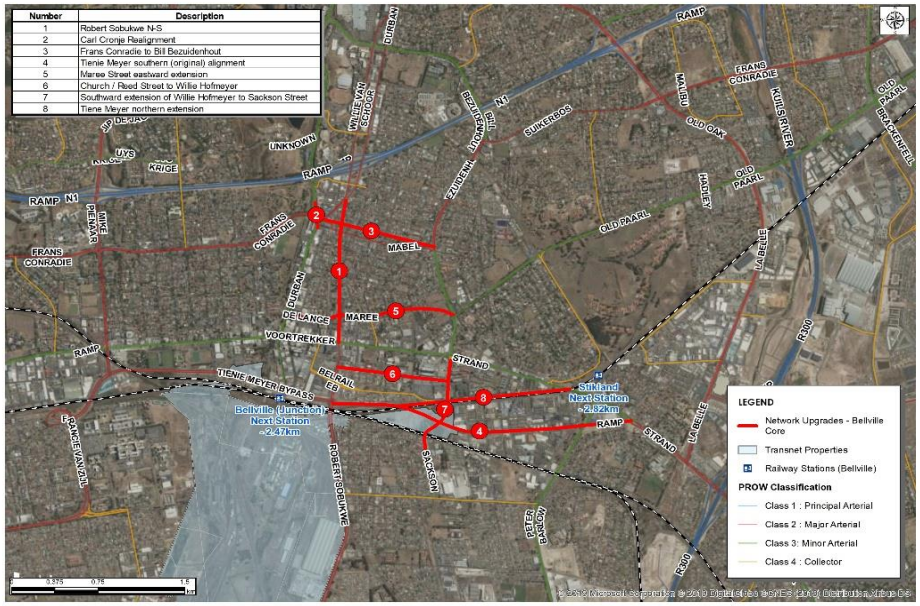
The model results clearly illustrate the combined positive impact that these projects can have on traffic reduction within the CBD core area. Large traffic reductions are expected along Voortrekker Road and Durban Road – two important roads where urban renewal and pedestrianisation are being considered.

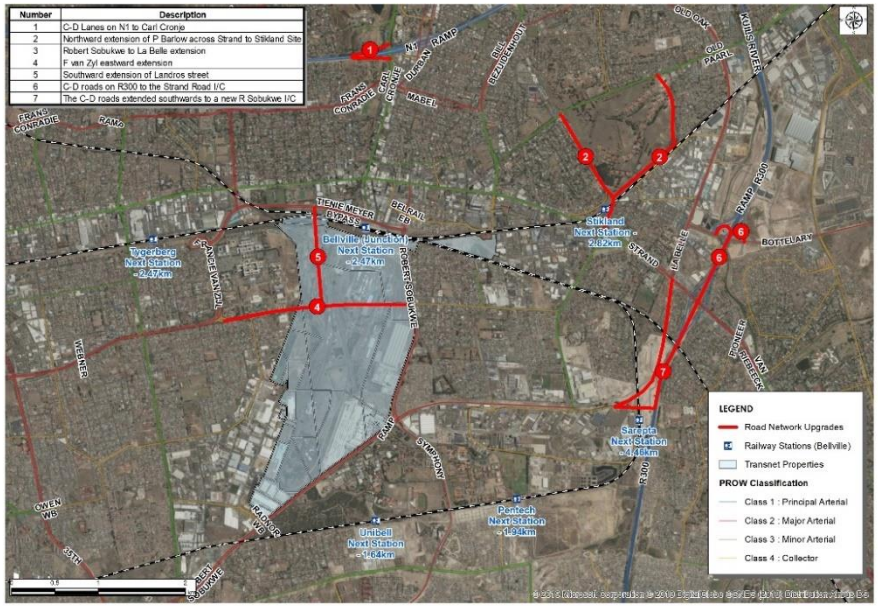
The results also identify and highlight some of the key missing links in the network. The introduction of the Robert Sobukwe Road (north-south) extension has a material impact on the north-south traffic movement, attracting significant vehicle volumes during the peak hour. Together with the Maree Street extension, these two proposals are major contributors to traffic reduction in and around the CBD area. Another important missing link is the southern extension of Willie Hofmeyer Avenue, which could play a major role in improving the overall efficiency of the road network east of the CBD.

In the absence of a final decision regarding the preferred alignment of the Tienie Meyer extension, it was decided to assess both options for the combined core network analysis. In each case, the results confirmed the need for the extension of Tienie Meyer, with the objective to provide improved connectivity to the east.

B – Extended Network Road Proposals

These are road proposals located outside of the primary study area but within the secondary area that contribute a positive redistribution of traffic using roads that pass through the Bellville CBD area while addressing a number of identified metropolitan level network issues or short-comings.



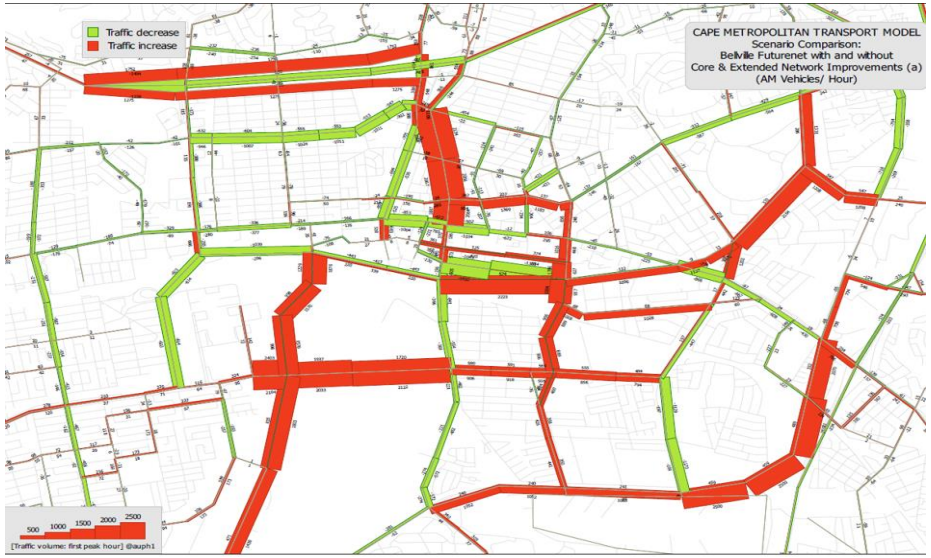


These road proposals have been modelled individually to assess the high-level implications of the road proposal introduction into the broader network and to assess potential influences on the Bellville CBD core.

In most cases, their impact on the CBD core is marginal or negligible yet they do fulfil a broader role in the wider road network that needs to be taken into account particularly where they interface with key core road proposals such a Tienie Meyer By-pass extension and the Robert Sobukwe (east – west) extension to La Belle Road.

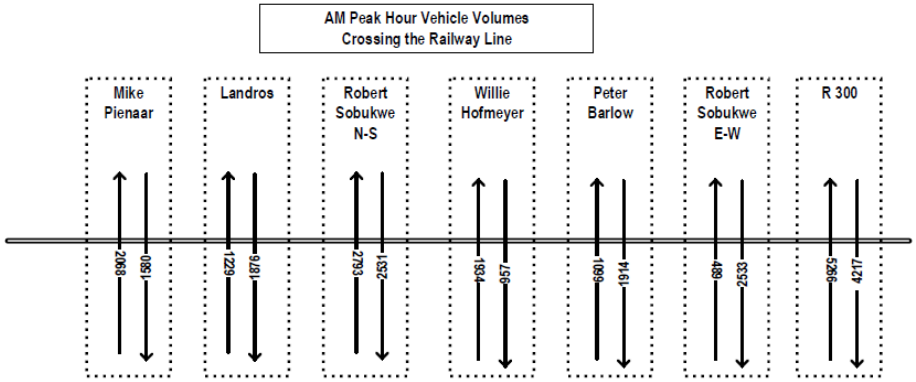
Combined Core & Extended Network Road Proposals

The extended network has also been modelled collectively with embedded core area road proposals where the final modelled implications are shown below. Links reflected in green indicates network links with associated traffic decreases and those in red reflecting network link traffic increases. This clearly demonstrates the positive effect of the packages of road proposals on the Bellville CBD core.



Rail Crossing Capacity

A key consideration in assessing the necessity for the additional crossings of the railway line passing through the Bellville core area, is the capacity available relative to the peak hour vehicle demand. The Figure indicates the end state AM peak hour vehicle volumes associated with each of the crossing points. Each crossing point reflects a demand level that warrants the provision of the crossing. This is illustrated in the diagram below.



Public Transport

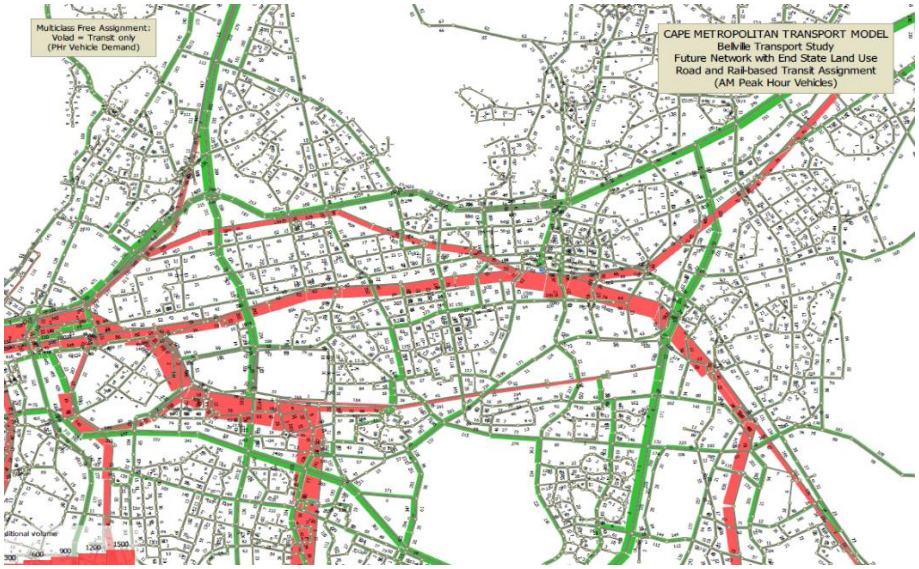
Public Transport Macro Modelling

The EMME model public transport outcome, with End State land uses, is reflected in in the figure below. It reflects a strong role for rail while key road-based trunk routes through the Bellville core area indicating demands that begin to breach the capacity thresholds associated with BRT systems. It must be noted that the public transport model reflects a conservative approach to modal split outcomes. Even with such an approach, the public transport volumes are

significant requiring fundamental policy responses to accommodate them. Until clarity is reached on how these passenger volumes can be accommodated, caution is required regarding “pushing” a more aggressive public transport modal split agenda.

This suggests the need to consider a technology step change from BRT to LRT responses.

The table below illustrates generally accepted capacity ranges for a number of public transport technology responses.



Public Transport Technology Choice Framework

The modelled outcomes are suggesting that technology steps will require consideration, specifically from BRT to LRT. Various technology choice frameworks have been compiled internationally, each reflecting nuanced differences in various characteristics that influence the technology choice.

One such framework is reflected in the table below.

Mode	Implementation Timeframe	Capacity (pphd)	Max Gradient	System Life (Years)	Unit Carrying Capacity	Infra Cost $m/km	Per Pax Operation Cost $/km	Travel Speed km/h	Optimal route length	Optimal Stn Spacing
Bus	Short	2500-6000	13%	8-14	40-120	0.2-2.6	0.23	10-18	15	0.3-1.0
BRT	Short/Medium	4000-10000	13%	8-14	40-120	5.7-22.5	0.23	15-23	15	0.4-1.0
Skytrain	Medium/Long	6000-10000	>10%	n/a	60-120	10	n/a	17-30	3-10	0.3-1.0
Tram	Medium/Long	5000-10000	10%	25-50	400-600	6.7-21.5	0.26	15-23	15	0.4-1.0
LRT	Medium/Long	10000-25000	10%	25-50	400-600	6.7-21.5	0.26	17-30	15	0.4-1.0
MRT/ Metro Rail	Long	20000-35000	3%	25-50	2000-3000	8-30	0.19	25-40	30	0.5-3.0

Public transport, both rail and road based public transport, comprise two of the three Bellville CBD renewal pillars. Failure to address either or both of these, significantly diminishes the ability of the City to successfully restore the Bellville CBD as a significant economic node.

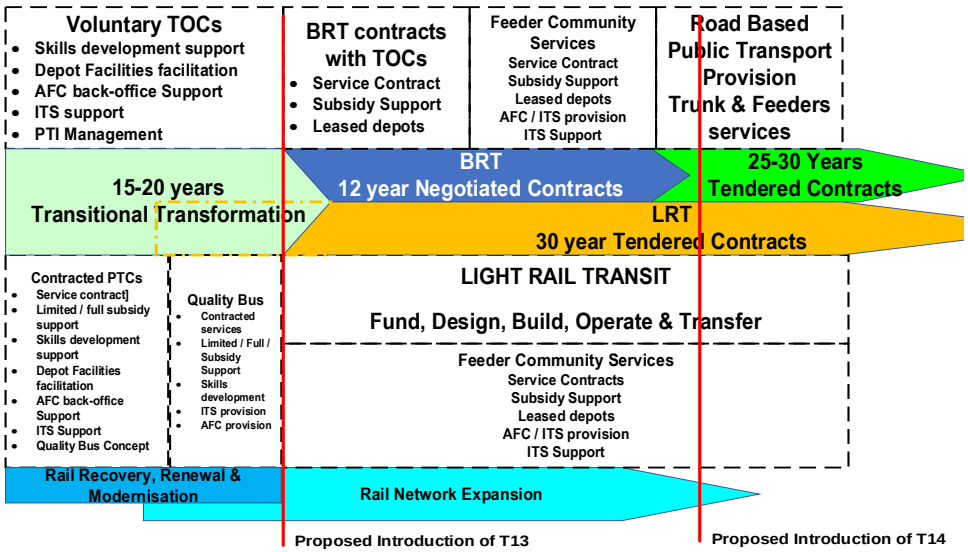
Public Transport Timelines

A realistic assessment of the timelines associated with rail recovery and road based public transport transformation, including the continued roll-out of the City’s IPTN implementation plan, highlights several realities. These include:

- The current chaotic provision of road based public transport provision is not conducive to economic renewal envisaged by the City;
- Passenger rail recovery and modernisation will not happen quickly, and realistically could take 10-15 years to materialise;
- Transformation of current non-integrated informal mini-bus taxi industry and scheduled contracted bus services into an integrated public transport system is non-negotiable;
- The IPTN delivery timelines associated with Trunk Route 13, unless the priorities are amended, will not occur within the next 15-20 years;
- When linked with the public transport modelling outputs which suggest that, under End State land use assumptions, the BRT capacity thresholds will be breached, requiring a consideration of a technology step change (to LRT).

The nature and extent of the overall transformation requires confirmation, but the diagram below illustrates realistic timelines associated with a number of public transport responses that have relevance.

Bellville Public Transport Timeline Context



Passenger Rail

Passenger rail has been in decline since 2004 due largely to technology obsolescence, vandalism, arson, land encroachment and significant criminal theft of key infrastructure elements critical to maintaining services on the various operating lines. Institutional stability has also been severely compromised with a lack of continuity of experienced senior management and board appointments.

PRASA Achievements

Despite this, PRASA has made significant investments in seeking to advance network and rolling stock renewal and modernisation, including:

- The local manufacturing of new generation rolling stock
- The modernisation of the signalling system
- Initiatives for the securitisation of the Metro South East Corridor
- Enforcement agreements with the Province and the City of Cape Town
- Tenders for the modernisation of the upgrading of the Salt River Rolling Stock Maintenance Depot
- Development initiatives

That noted, a realistic assessment is that a PRASA recovery plan, from the current base and with the modernisation backlog, is optimistically likely to take some 10-15 years to complete.

This recovery can be significantly supported by an appropriately transformed road based public transport industry that is able to keep pace with a renewed and modernised passenger rail service

It is obvious that passenger rail has a critical role to play in accommodating the modelled passenger transport demand generated by the End State land use.

Accordingly, passenger rail service re-instatement to levels of service to accommodate a minimum corridor practical capacity of at least 25 000 passengers / hour is required over the next 5-10 years. With the introduction of new generation rolling stock, a modernised signalling system and a progressively modernised infrastructure base, enhanced levels of service providing a practical corridor capacity of at least 45 000 passenger / hour should be progressively provided.

Light Rail Transit

Due to the very high public transport demand expected along the Robert Sobukwe north-south corridor, it became necessary to explore the introduction of a complementary light rail transit (LRT) system from the Tyger Valley area in the north to Cape Town International Airport in the south. The benefits of such a proposal would be higher capacity, improved levels of service and reduced travel time due to exclusive right-of-way operations within dedicated light rail reserves.

The EMME model results show that the proposed LRT system has the potential to dominate the north-south transport corridor, capturing most of the original

MyCiTi passengers, and thereby rendering the BRT not viable as a parallel or complementary mode.

The redistribution effect is however expected to go much wider, with the LRT attracting passengers from other parallel road-based services, including the R300. This is also evident in the Belhar and Delft residential areas where significant passenger numbers, which previously used the Sarepta railway line, shifted across to the new LRT system.

Due to the redistribution effects, the LRT is expected to carry much higher passenger volumes (up to 57% more) than the MyCiTi BRT proposal – 36 000 versus 23 000 AM peak period northbound south of Bellville Station. This passenger increase can also be attributed to better connectivity and transfer opportunities with east-west routes such as the future Francie van Zijl Drive and Kasselsvlei Road.

Other findings of the LRT modelling preliminary review can be summarised as follows:

- With the introduction of the LRT, the east-west rail passenger volumes also increase, due to the proposed seamless transfer opportunities with the north-south LRT services at Bellville Station;
- The Airport connection carries significantly fewer passengers than the high transfer volumes from the south. It seems logical therefore that this demand profile could swing the case for southern continuity, and the extension of the LRT towards the Metro-South-East;
- It appears that the northern connection with the Tyger Valley area via Carl Cronje Drive, attracts a disproportionate number of passengers from the Robert Sobukwe Route, many of them switching back at the Frans Conradie interchange. This type of network inefficiency requires further attention and deliberate planning intervention to optimise the role and function of the two complementary routes.

This LRT study should be seen as an initial exploratory assessment of a potentially very large infrastructure item with huge costs and operating expenses. At the same time, the benefits for the metropolitan area could be significant and lasting, and the positive impact on Bellville's CBD beyond question.

Road Based Public Transport

An optimised road based public transport system, supportive of passenger rail and providing focused trunk, feeder and community services, is the second public transport element that is necessary to ensure that an effective and supportive platform is provided for urban development in the Bellville CBD. This situation does not exist at present. A number of interventions will be critical in ensuring that such a system materialises.

Road Based Public Transport Transformation and Integration

Road based public transport, associated with the Bellville node, is currently provided by a subsidised scheduled bus service and a non-subsidised mini-bus taxi industry that is, for the most part, operating under Operating License mandates although there is a substantial number of illegal operations using the facilities.

Given the City's focus on providing levers and interventions that accelerates the renewal and redevelopment of the Bellville CBD core and re-instils developer confidence in the City renewal intentions, the transformation of road-based public transport into an integrated public transport system that provides the appropriate level of spatial, temporal and frequency responses, requires to be accelerated.

This requires a detailed public transport system planning initiative that provides an integrated set of public transport routes, services levels and mixed fleet indications that will guide negotiations with both the existing minibus taxi industry as well as the subsidised bus service provider.

The outcome required is a mini-bus taxi industry that transforms into formalised public transport companies (PTCs) and that allows negotiated / tendered

contracts to be concluded with all public transport operators to provide the level of contracted public transport service to support the incremental renewal of the Bellville CBD.

The rate of transformation of the road based public transport sector serving the Bellville economic node, will be a key determinant in establishing a level of investor confidence to invest in infrastructure investments that will drive relevant urban and economic renewal of the Bellville CBD core.

Public Transport Interchange Facility ("Mobility Hub")

There is general consensus that the current integration of public transport services within the Bellville node are not adequately or effectively integrated. The current urban environment does not lend itself to transfers between the various modes that enhance the passenger's travelling experience.

Consideration of the various studies undertaken over the recent past, together with considerations emanating from the current work, suggest that there is merit in considering a vertically located public transport facility located above the Bellville Station.

Access can be provided to either an eastern or western located deck arrangement via Tienie Meyer Bypass and Robert Sobukwe Road.

The sizing of the deck platforms to support road public transport supports the transformation of the mini-bus taxi industry and has been constrained to operational requirements. It assumes that on-site parking and holding will not be able to be accommodated – from an economic perspective. This will require a remote holding area which can be utilised by both the mini-bus taxi industry as well as the subsidised bus services during a transitional transformation process.

Careful "future proofing" design consideration of both the PTI and the holding areas should ensure that both areas can be developed incrementally into a commercially viable mobility hub.

As part of the intention for "future proofing" the Bellville PTI as a future "mobility Hub", it would be logical to ensure that combined inter-town & inter-city service accommodation are not precluded from being incorporated adjacent to the proposed facilities that allow passengers to transfer to or from the local public transport services.

Parking and Goods Loading

In support of the intention to rejuvenate the Bellville CBD, is the need to:

- review parking and goods loading policy, as it relates to a CBD in the metropole, and
- the status of the present related zoning conditions, and the realities of the situation on the ground.

Complementary to the notion of having a public oriented development environment, is that of ensuring an abundance of road space allocated to the movement and interactions between people / pedestrians, and the creation of public space.

Doing this facilitates a people first policy, the identification of pedestrian dominated roads & spaces, and the systematic decrease or total exclusion of private vehicles from these pedestrian areas.

Logically this should not be interpreted as meaning that there will not be a situation where vehicular traffic will not have limited access, particularly so for goods delivery, refuse removal, maintenance & emergencies.

The approach that should be pursued should consider;

- The declaration of the area as PT2 Zone, where it is permitted that on-site parking should not exceed the Town Planning requirement for such a zone;
- The declaration of an outer band as a PT1 Zone, where the parking requirement falls between the prescribed levels;

- The removal, as far as possible, of all on-street parking within the declared areas, and on all Class 3 & 2 roads within the study area;
- The provision of public accessible parking (on-street or lots) for which parking is charged. This to be based on an annually reviewed supply & demand assessment that ensures turnover & the ready availability of a limited percentage;
- The provision of access to any public parking area will avoid passing through pedestrian dominated areas;
- The comprehensive assessment of future parking requirements, that should include kiss & ride, e-hailing & metered-taxi demands;
- The delivery of goods, and removal of refuse which requires special consideration;
- With the prospect of the redevelopment of significantly large sites, there might be opportunity to consider the development of a central delivery terminal, and a combined surface & sub-terrain distribution network to serve the CBD core. The alternate to this is the review of both on- and off-site delivery zoning requirements & opportunities.

Contents

Figures

Tables

Appendices

1. Introduction

1.1 Background and Overview

Historically Bellville has been subjected to several spatial and road structuring reviews. Despite these initiatives, very little progress has been made in advancing the resultant recommendations other than the preparation of a number of conceptual road proposal designs.

The Tygerberg Spatial District Spatial Development Framework (2012), while somewhat dated, highlights challenges that are still relevant today and to this study. It notes, *inter alia*:

- *Areas within the district exhibit poor socio-economic conditions, with a general lack of integration of income groups. Housing shortages, severe overcrowding, a degraded urban environment and high crime rates have resulted in unhealthy living conditions and unfavourable investment conditions;*
- *The lack of north-south continuity of movement routes throughout the district further compounds the lack of investment opportunities linked with the accessibility grid;*
- *The urban fabric within parts of Tygerberg District can be described as 'cellular' in nature. The internal 'compartmentalisation' of the district can be attributed to a number of critical factors including:*
    - *The barrier effect of east-west railway lines;*
    - *discontinuous north-south road linkages;*
    - *the 'buffer effect' of the existing land use structure, especially industrial centers.*
- *The lack of centralised and accessible nodal areas, predominantly in areas south of the Bellville railway line, limit investment opportunities.*
- *At a broader district scale the strategic location and extent of the Transnet site causes it to act as a substantial 'mono-functional' buffer with little or no interaction or interface with surrounding areas. The precinct forms a constraint to the southern extension of the Bellville Central Business District (CBD) and spatially reinforces the barrier effect of the rail line by preventing access to and from the south of Bellville Station, and stifling economic development south of Voortrekker Road.*

Since 2013 the City has revisited the Bellville node, but with a very different focus. The first key informant is the reinforcement that the Bellville node remains the second economic node within the metropolitan area, one that faces significant challenges but offers tantalising opportunities. The second is that if the City is to become spatially and economically equitable and efficient, a very different approach needs to be adopted to bring about urban renewal and densification that is supportive of a more liveable pedestrian and public transport-oriented environment.

This approach is supported by the National Land Transport Strategic Framework (2017-2022) which notes that:

> *"Effective, efficient and inclusive urban transport systems are a pre-requisite for economic development and for social equity and cohesion. Maintaining mobility and accessibility in appropriate locations will ensure social connectivity and economic growth (s3.2.4)"*

At a generic level, this urban renewal and densification approach – transit oriented development (TOD) – is succinctly captured in the vision for TOD in Cape Town as outlined in the "CCT TOD Strategic Framework' (V1. October 2015) which is to:

> **"Progressively move forward a compact, well connected, efficient, resilient urban form and movement system that is conducive to economic and social efficiency and equality whilst providing cost effective access and mobility, with the least possible negative impact on the environment."**

The current work intent is founded on the work previously completed and reported on in the Bellville Integrated Transport and Land Use Plan (March 2016), and its supplementary report TOD Opportunities Investigation for the Bellville Station Precinct (April 2016) as well as a City internal cross-departmental workshop entitled Accelerator Report: Bellville Opportunity Area, Workshop Minutes Report (March 2017).

Of importance to note is that the initial professional support approved for this project only made provision for town planning input primarily to guide the macro level modelling requirements. No provision was made for urban design support that would guide and inform micro-level transport responses including non-motorised transport (NMT), freight and parking accommodation. This influenced the outcomes that emerged from the study as it progressed.

1.2 Purpose of Study

The City of Cape Town requires a review of all transportation planning associated with the Bellville CBD precinct. The intended outcome of the review is a synthesis of all planning proposals that have been considered to date and the formulation of a Bellville Transportation Master Plan Framework that will:

- be endorsed officially and politically;
- provide a degree of certainty regarding future infrastructure provision;
- provide a more informed position on public transport service provision;
- inform infrastructure and public transport service provision implementation budgeting cycles, and
- provide a stable foundation upon which general development within the Bellville CBD precinct can be leveraged, by both the public and private sectors.

1.3 Envisaged Study Outcomes

The initial study outcomes included:

- A detailed system level review of transportation (road and public transport) responses to land use – envisaged development intentions, with transportation interventions reflecting public transport reconfiguration options indicated in 5-year implementation periods;
- A detailed core area transportation response framework highlighting envisaged public transport options and configurations and NMT networks framed around agreed road proposals and configurations.
- A final land use and transportation framework plan to guide transportation and property development investment.

As the study evolved, amended outcomes emerged that focused on:

- a more in-depth and comprehensive understanding of the **end state land use** envisaged for the primary area which informed the core road proposal responses that would be supportive of a TOD development philosophy within the Bellville CBD core area;
- the identification of the **"core area road proposals"** that would significantly contribute to traffic reduction in, or redistribution from, the CBD core to facilitate a public transport / pedestrian-oriented environment supportive of TOD principles;
- the identification of **"extended network road proposals"** that, while not directly impacting on the primary study area (the CBD Core), have broader regional ramifications for wider traffic distribution primarily associated with the secondary study area;
- understanding the **road based public transport IPTN delivery timelines**, interim road based public transport transformation intentions and responses including a better understanding of feeder and community services to support the primary and secondary study areas;
- a more comprehensive review of the **implications of a vertically integrated mobility interchange facility with Bellville Station** that is supportive of the integration of the land parcels to the north and south of the Bellville Station and that facilitates the release of land, currently being used as a road based public transport terminal, for development purposes;
- the associated road based **public transport interchange support requirements** (transitional holding area / multi-modal depot responses), and
- the realization that envisaged end state public transport passenger demand may breach **Bus Rapid Transit (BRT) capacity thresholds**

necessitating a high-level consideration of a public transport technology step change.

1.4 Structure of this Study

This report is structured as per the following:

- Section 1 – Introduction
- Section 2 – Study Area and Context
- Section 3 – Transport Status Quo
- Section 4 – Land Use
- Section 5 – Macro Level Modelling
- Section 6 – Core Area Road Proposals
- Section 7 – Extended Network Road Proposals
- Section 8 – Public Transport
- Section 9 – Public Transport Interchange
- Section 10 – Parking and Goods Loading
- Section 11 – Intervention Sequencing
- Section 12 – Conclusions
- Section 13 – Recommendations

1.5 CBD Master Plan Framework

The approach to the Study was guided by a consideration of three inter-dependent pillars that are deemed to be necessary if a successful regeneration of the Bellville CBD as the City of Cape Town's second economic node is to be realised and that is supportive of the densification intentions that contribute to the transformation into a spatially efficient and equitable city.

The three pillars are:

a. Urban renewal and Economic Regeneration

b. Road Based public transport transformation, and

c. Renewal of passenger rail services

Figure 1 illustrates this co-dependency. The overlapping areas highlight key policy response areas including modal integration, integrated neighbourhood development, NMT provision and a focus on transit-oriented development.

A set of four objectives or outcomes have been articulated for each of the pillars to provide some guidance as to the nature of interventions required to give effect to each of the pillars.

Underpinning this framework is a set of principles[2] that advocates:

- **Affordability**- reducing the cost of public transport to commuters and the cost of providing public transport to the City;
- **Accessibility**- facilitate equal access to social and economic activity through strategic urban development and the provision of safe public transport;
- **Efficiency**- provide an environment and level of service that reduces trip lengths and dependence on private vehicles;
- **Intensification and Densification** - manage the desired form, composition and location of urban development conducive to affordable, accessible and efficient public transport.

[2] GAPP, TOD OPPORTUNITIES INVESTIGATION FOR THE BELLVILLE STATION PRECINCT, 2016, in part

These principles need to be supported by a mindset shift that places the pedestrian and public transport ahead of the private vehicle as succinctly articulated in the complete street philosophical approach indicated alongside, while respecting the role of road hierarchies.

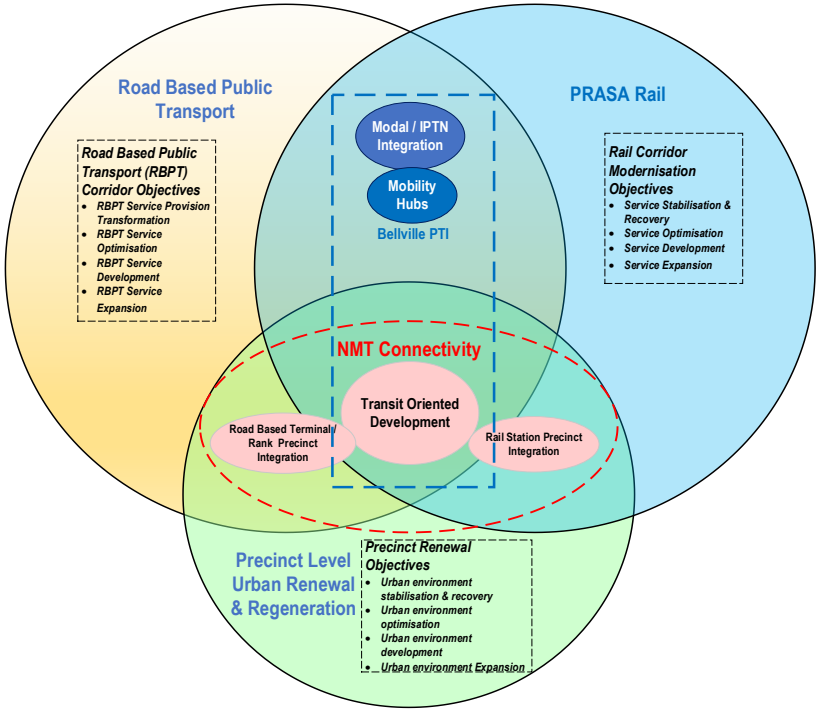


Figure 1: CBD Master Plan Framework

The four objectives broadly cover the following areas of pillar development:

- Public transport service and urban environment stabilisation and recovery;
- Public transport service, asset and/or urban environment optimisation;
- Public Transport business and service development / urban environment development; and
- Public Transport service business and service expansion / urban environment expansion.

Table 1 provides a broader interpretation of the envisaged pillar development outcomes.

Table 1: Bellville CBD Master Plan Objectives Framework

Road Based Public Transport	Passenger Rail Modernisation	Urban Renewal & Regeneration
1. **Road based public transport service provision transformation –** initiation of mini-bus taxi transformation to form public transport companies (voluntary or preferably contractual), scheduled road based public transport services & skills development	1. **Rail Service Stabilisation & recovery -** focus on rolling stock recovery, renewal & modernisation of rail operational assets, revitalising & modernising rail operational performance, station & associated facilities improvements, logistical support, infrastructure support, maintenance of minimum levels of service, staff training	1. **Urban Environment Stabilisation & Recovery-** strengthening institutional arrangements to address "crime & grime", meaningful stakeholder engagement, urban renewal project initiation, focused law enforcement
2. **Road based public transport service optimisation –** optimised scheduled road based public transport services to provide better integration with rail based services, minimised fleet requirements, enhanced levels of accessibility (spatial & temporal), formalised remote depot / holding area, depot related activities	2. **Rail Service Optimisation – "Sweating the assets"** – rolling stock capacity reinstatement, optimising the use of existing asset capacity + value added service provision, initiation of enhanced levels of service quality, strengthening Park & Ride facilities, introduction of modal integration initiatives	2. **Urban Environment Optimisation -** Public sector asset utilisation optimisation, progressed stakeholder partnership initiatives, value added asset provision, enhanced levels of law enforcement
3. **Business & Service Development –** Recapitalised UA accessible road base public transport fleet, enhanced levels	3. **Business & Service Provision –** modernised rail asset base + enhanced levels of service quality + strengthened modal	3. **Urban Environment Development -** Leveraged public sector joint planning & development initiatives,

Road Based Public Transport	Passenger Rail Modernisation	Urban Renewal & Regeneration
of service quality, strengthened modal integration (services, fares, ticketing), PTI management contracts	integration (services, fares, ticketing), value added services + commercialisation of non-productive station properties	leveraged private sector asset base, creation of safer inter-connected urban & public open spaces, urban space-based leisure activities, market responsive mixed use developments
4. **Business & Service Expansion –** value added services to broaden peak product offering, terminal / rank commercial development opportunities & socio-economic initiatives	4. **Business & Service Expansion -** rail infrastructure expansion, focused rail precinct mixed use developments, socio-economic initiatives & advanced customer care programmes	4. **Urban Environment Expansion -** Expanded commercial, residential, educational, health & hospitality precincts supportive of TODs

This framework is informed around several observations. These relate to:

- The ability of PRASA to bring about rail renewal and rolling stock and infrastructure modernisation within an acceptable timeframe. This timeframe needs to be cognisant of the critical role that rail plays and that any rail renewal & modernisation should be materially completed within a 10-15 year time horizon. Failure to do so will place a burden on road infrastructure that will not be able to accommodate the demands imposed.
- The transformation of the mini-bus taxi industry into formalised public transport service provider entities that provides contracted scheduled services using, in a short time span, a re-capitalised universally accessible fleet. While it is the intention of the City to deliver a BRT system to the Bellville CBD, in the future, the delivery timelines associated with such a delivery are dependent on the completion of more highly prioritised BRT routes which appear to be facing increasing delivery delays. As such, it is likely that the current bus and mini-bus taxi service provision will need to be accommodated for at least the next twenty years. Failure to address this in a manner that adds value to the passenger's travelling experience will not engender investor confidence to invest in infrastructure provision or promote the envisaged modal shift required.
- The ability of the City to enter into appropriate joint planning, development, funding / financing and implementation agreements and protocols and to advance these through pragmatic delivery programs that facilitate accelerated urban renewal and regeneration.

The key to a successful outcome will be to ensure that a balanced response is achieved, ensuring that each delivery stream achieves a critical mass to enable the others to reach a similar level before advancing. This balancing is critical noting that any imbalance in delivery can lead to market and investor disillusionment.

2. Study Area and Context

2.1 Study Area Informants

Three key informants are pertinent:

- Land use scenarios – inclusive of current development intentions as well as a consideration of the City's practical transit-oriented densification policy intentions;
- Broader transportation system road network (classification, cross-section) and public transport responses, and
- A detailed understanding of the interchange movement system requirements at a core (1 km radius) precinct level around the Bellville railway station and envisaged PTI location.

2.2 Determining the Study Areas

Two study areas are defined:

- a primary (core) area focused on the Bellville CBD area centered around the Bellville Railway Station and current / proposed PTI locations, and
- A secondary area that is required to confirm the system level transport demand, road proposals and public transport responses.

The Primary (Core) Study area was determined based on an assessment of areas of specific development interest, envisaged concentrated activity, together with the Metropolitan Macro Transport Zone boundaries forming the basis of the City of Cape Town's Pragmatic Transit Oriented Development (PTOD) Model.

The recently completed (2016) BITLUP study is a key informant into the overall process and the BITLUP Focus Area zones are embedded in the proposed Primary Study (Core) area.

The Secondary Study area was framed to capture surrounding activities that could have secondary impacts on both the land uses and transport activities within the Primary (Core) Area while also allowing the "spill-over" implications of the Primary Study area on the wider transportation network to be identified. The figure below sets out these study areas, and also identifies the additional key sites that was added to the primary study area. The study areas are shown in Figure 2.

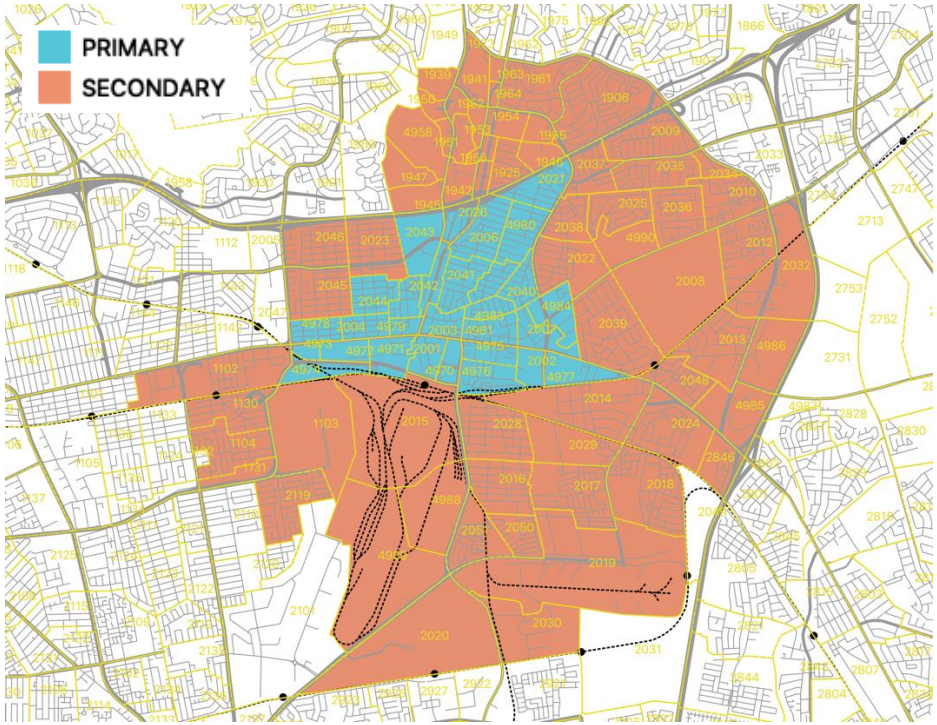


Figure 2: The Primary (Core) and Secondary Study Areas

2.3 Synthesis of Previous Studies

A synthesis has been done on the previous studies and these are discussed in the tables below.

Study Details	Brief Description
Study Name: Bellville Tyger Valley Area - Transport Master Plan **Client:** Stellenbosch University **Report Status:** Final **Date:** December 2018 	**Background:** The Tyger Valley Area (TVA) located in Bellville, north of the N1, has experienced high development growth over the last 25 years or so mainly as a result of high income residential areas as well as the good accessibility provided by the N1. Substantial land use rights have been approved in the TVA by the City in the past, however major other areas are ready for development and application for land use rights. There are large portions of developable land north of the N1 as well as in the southwest corner of the TVA. A thorough investigation was carried out by AECOM (client: Stellenbosch University) regarding the transport servicing for the larger area to inform the land use application. This strategic project investigated the impacts of potential developments as well as the identification of and integrated transport system that is feasible and also consist of various modes that can have a phased implementation. **Outcomes**: The study has identified thirteen road upgrading projects to service the TVA and adjacent areas. The need for an investigation to the addition of a further half diamond interchange directly to the University of Stellenbosch's Business School site from the proposed Connector-Distributor (C-D) roads suggested along the N1 were identified. Public transport services were identified in the area to service the TVA in future and implementation thereof are recommended within the study. Non-motorised transport and transport demand management measures for the area were considered for the study area and recommended for implementation. The release of bulk was recommended within the TVA with a link to infrastructure provision.

Study Name: Bellville Land Use Master Plan & Preliminary Feasibility Study
Client: Transnet Freight Rail
Report Status: Draft
Date: Unknown

Background:

The main aim of the study was to produce a planning and development framework for the Transnet/TFR land holdings in the Bellville Area and taking into consideration Council policies and plans for the wider area, the road infrastructure and traffic situation, the surrounding land uses and property market conditions, rail operations, freight traffic and inter-modal capacity. Importantly, the existing land and infrastructure constraints and opportunities have been considered and investigated.

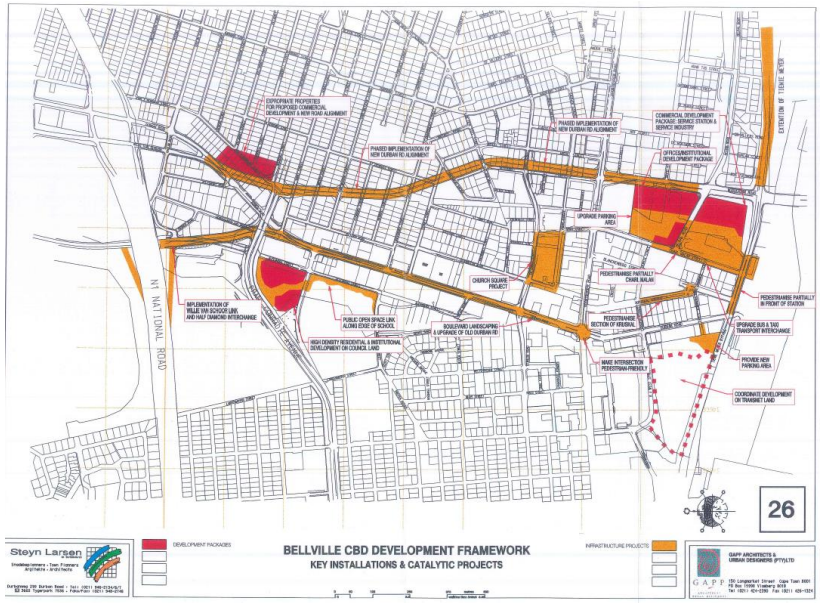
Outcomes:

The main outcomes of this study are as follows:

- Preference given to long lease versus disposal of land for development
- The timing and size of land release/availability
- Development resources – sourcing capacity & resources from private sector

The study approach proposed focuses on utilisation of existing demand, by starting with container storage leases on the existing slab. Various phasings were proposed in this document that could form a land use pattern over time that can unlock the potential value of the land, such as:

- Upgrading entrances and internal road network and upgrade existing slab, equipment and terminal operations;
- Relocating their Supply Chain from Salt River;
- Initiating discussions with UWC regarding logistics and trade centre of excellence and innovation (Innovation Hub). Undertaking feasibility and develop accordingly;
- Preparation of a re-development concept around TFR building area – linked or not to Innovation Hub area and produce feasibility study. Secure internal Transnet tenancy into TFR building and possibly also external freight logistics business users;
- Improving existing leases and tenancy on Modderdam Rd north-south and secure new leases for freight logistics warehousing in this area as outlined for phase 2 layout. Build internal road network to support property development.

Study Details	Brief Description
Study Name: Bellville CBD Development Framework **Client:** City of Cape Town **Report Status:** First Draft **Date:** July 1999  	**Background:** The main objectives for this study was to establish a framework for sustainable growth and integration of the Bellville CBD with the Tyger Valley Development Node. Main aim being to provide development and investment proposals to ensure market driven growth and planning that will be flexible enough to amend as market forces change. **Outcome:** The outcome identified the following catalytic projects: • The implementation of a new Durban Road alignment with a phased approach; • The redesign of Durban Road as an activity corridor which can only be implemented when the mobility corridor is completed up to Voortrekker Road; • The eastward extension of Frans Conradie Avenue between the old and new Durban Road intersections; • The half diamond interchange on the N1 freeway – for the improvement of access and alleviation of congestion; • The eastward extension of Tienie Meyer Drive; • The redesign and implementation of various development proposals for the area surrounding the modal interchange; • The redevelopment and upgrading of Church Square, Maree street and the pedestrian mall; • The pedestrianization of the southern leg of Kruskal Avenue and management thereof; • Landscaping proposals for various pedestrian routes, squares and activity corridors that could be implemented with each phase of redevelopment.

Study Name: TOD Opportunities investigation for the Bellville Station Precinct
Client: City of Cape Town
Report Status: Final Draft Report
Date: April 2016

Background:

The mentioned study was an investigation to confirm the TOD potential for three strategically located land parcels in public ownership namely, Paint City, Bellville Transport Interchange and Bellville Station northern edge which are vacant and / or underutilized within the Bellville Station Precinct.
The main objectives of the study were to explore the development potential of the above sites in order to:

- Identify possible short-term income generation projects to facilitate cross-subsidisation of public transportation operation costs;
- Support the realisation of the objectives as identified in the CCT: TOD strategic framework; and
- Identify possible design changes to proposed projects on the sites that would enable the above.

Outcome:

A phased implementation of three sites has been recommended, with the Paint City site being the first project to be developed. This relates to it having the least development obstacles associated with it.

<u>Paint City Site</u>

It was concluded that this site has the least obstacles to development and the most potential to initiate catalytic change to the area.

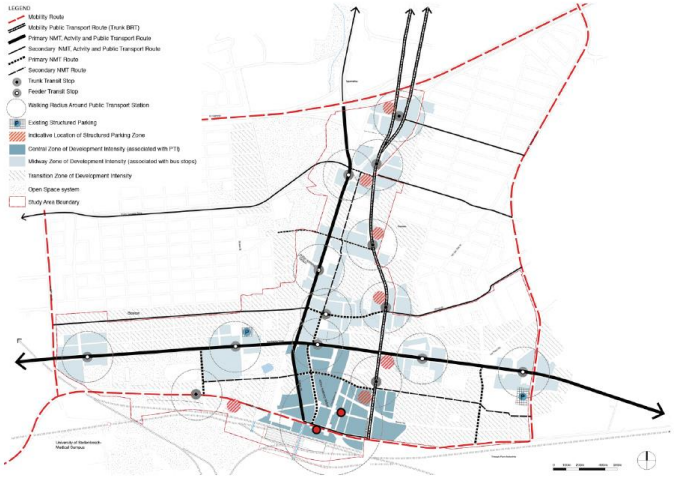
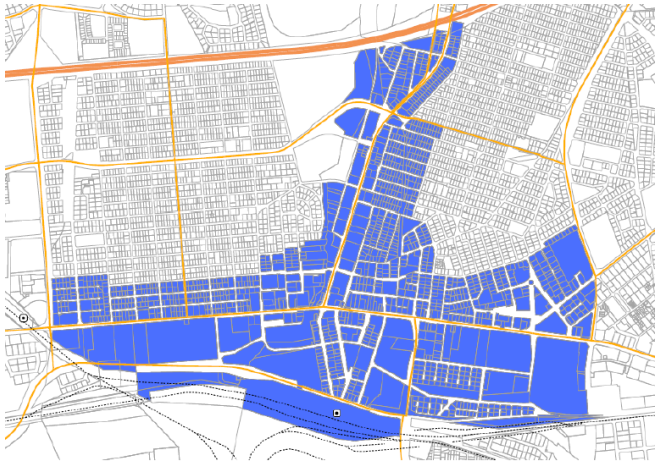
<u>PTI Site</u>

It was identified that this will be a complex project to implement but holds much potential for income generation as well as urban renewal, if developed. It was recommended that it is developed in a phased manner after the PTI upgrades are completed.

<u>Bellville Station Site</u>

The development yield exploration undertaken for this site confirmed and demonstrated its significant development potential. The City does not own the site, and some key actions identified for the City were the following:

- Discussions with PRASA on the long-term development potential of the site; and
- Discussions with PRASA on the impact of small scale projects to the quality of the public environment.

Study Details	Brief Description
Study Name: Bellville Integrated Transport and Land Use Plan (BITLUP) **Client:** City of Cape Town **Report Status:** Final Draft **Date:** March 2016  	**Background:** The BITLUP study has assessed current conditions and recommended strategies and projects to bolster the strengths and address the weaknesses of the study area (referred to as the Bellville Core Area, or BCA). For this purpose, the context includes physical infrastructure, land uses and various activities they generate, regulatory controls and standards, policies and plans, transport operations, and proposals within and outside the BCA. The Contextual Analysis report has been supplemented with information included in the BITLUP report. The following key contextual issues have emerged from the study. **Outcome:** Various objectives have driven the outcome of this study and it has been concluded that these will only be achieved with the following transport instruments: • Application of the road access policy and road design standards • A gradual but significant change in the quantity and location of parking provided • Street vending arrangements and urban design • Enforcement of regulations important for urban management • Maintenance that allows for good functioning of spaces/infrastructure • Pedestrian and cycling networks • Building standards for facades, permeability and pedestrian and cycling facilities Projects have been identified during the study with important sequencing and their implementation begins with catalytic projects within a public investment framework and the first priorities suggested are: • Improvement of road conditions for NMT and the general quality of the street environment, with the extension of Robert Sobukwe Road that should be completed as soon as funding permits; • Public transport planning around the PTI should continue, but the priority is to institute a MyCiTi feeder route between Tygervalley Centre and Bellville station, including a direct connection between the station entrance and the feeder service; • Parking to gradually reduce as a ratio of supply in relation to developed floor areas (averaged at the precinct level); • Bulk services will need to be provided as growth requires, but there are existing shortcomings that should be addressed.

Study Details	Brief Description
Study Name: Urban Accelerator: Bellville Opportunity Area – Workshop minutes Report **Client:** City of Cape Town **Report Status:** Final Workshop Minutes Report **Date:** March 2017  Impression of re-imagining Bellville Opportunity Area based on workshop results Birds eye view from above Belcon lands	**Background:** The Urban Accelerator is a new approach that was developed for situations worldwide for emerging cities that have high dynamic environments with complex challenges. The main idea is therefore to do 'top down' analysis and 'bottom up' findings that are combined to define the key places that can change the city node to have direct effects that can trigger a ripple effect in the area. The main objectives of this study / or workshop were: • to identify practical TOD development opportunities; • to develop and weigh scenarios in a rapid manner; • to build rationale for a Development Agenda with transdisciplinary effort; • to define and reimagine the key places. **Outcome:** The workshop established an understanding of the key elements that could contribute to the accelerating function in the development of Bellville. Besides the PTI, these include elements like the Green Valley connections (NMT along Elsies kraal and to station and Tygerberg Hospital area with NMT bridge and route), the public concourse in the core area and redevelopment scheme of the City lands of the current PTI. It was identified that, for the PTI, a structural spatial design can be made considering the Development Agenda and an iterative process with the development plan: • As an intermediate between the workshop and the next steps PRASA and City need to undertake drafting a Terms of Reference for planning the PTI; • Combined with the urban accelerators, several mobility pilot projects can be introduced on 1) NMT (in quality and safe public space) 2) Bike sharing system between Public Transport Interchange and universities. Various suggestions were also provided regarding ambitions on a City-wide scale: A first suggestion was to think about setting up a Mobility Board (public, private, NGO's, stakeholders). Further, to start an interactive plan process for Smart Moving Cape Town (Mobility Plan); the type of solutions or certain big interventions in the various Accelerator or Catalytic projects can serve as essential game changers and shift the modal split to fewer cars, better mobility. Lastly, it is suggested to collect further data on all mobility aspects.

Study Details	Brief Description
Study Name: Transformation of the Bellville Public Transport Interchange (PTI) – Conceptual Design Report **Client:** City of Cape Town **Report Status:** Final **Date:** March 2016  	**Background:** This study investigated the underlying motivation for the Bellville PTI design concept and investigate the impact on the PTI users and systems. The implementation framework and flexibility of the design are also highlighted. The study is concluded with an overview of the progress to date (2016) and the proposed way forward. The main aim for the upgrading of the PTI is to create a facility that meets the following objectives: • Accommodates current and projected passenger and vehicle volumes; • Creating a commuter friendly environment which ensures seamless transfer between transport modes; • Aligns with the City's IPTN and provides for inclusion of future phases of the IPTN at this facility • Helps to promote TOD around the facility. **Outcome:** The area within and around the Bellville PTI has been analysed with regard to various elements. From this analysis, a set of opportunities and constraints have been identified, which gave rise to a Concept Design for the project. The proposed concept was structured around thirteen principles. • Connecting the PTI spatially - creating corridors of public space to facilitate movement in all directions, be it for pedestrians or vehicles • Linking and integrating Public Transport facilities and functions • Increase and optimise the operational area of the Bellville PTI • Separating Vehicles and Pedestrians to reduce conflict • Consideration of User comfort • Ancillary facilities and trading opportunities • Vertical elements for Landmarks and Orientation, Surveillance • Rationalise taxi operations • Split taxi access and egress to taxi rank • Avoid the dead-end configuration of the current arrangement • Facilitate ease and safety during drop-off and loading • Alleviate congestion at vehicular intersections around the PTI • Long term planning for Public Transport and TOD

3. Transport Status Quo

3.1 Existing Road Network

This transportation framework analysis focusses on the Primary and Secondary study areas. The N1 freeway is a main mobility route and provides access to the north towards the Tyger Valley area via Durban Road and to the south via Durban Road. The three main interchanges of Durban Road, Old Oak Road and Mike Pienaar (Jip de Jager to the north) provides access from the N1 towards the Bellville primary study area.

In 2000, the provincial roads department approved in principle the additional link with the N1 freeway called the Carl Cronje Half Diamond Interchange after a feasibility investigation.

Other major roads providing access to both study areas from an East-West direction are Voortrekker Road (Strand Road), Frans Conradie Drive, Tienie Meyer Bypass and Robert Sobukwe (East-West). Other significant North-South roads are Carl Cronje Drive, Bill Bezuidenhout Avenue and Robert Sobukwe Road.

3.2 Freight Routes

Freight movements did not form a definitive part of the study. The implications of freight accommodation primarily on the road network has been informed by two key informants:

- City of Cape Town Freight Management Strategy (June 2016)
- LMS initiative – an initiative to establish the levels of freight activity (including E80 determination)

The strategy is driven by the following identified needs that are relevant to the Bellville CBD core area, *inter alia:*

- Road-based freight has a significant impact on city infrastructure, urban quality & public health;
- There is a need to preserve the existing infrastructure (roads, rail, waterways and pipelines) and optimise its use;
- There is a need to cater for future freight growth and mitigate these impacts.

Drawing from these two initiatives two key implications can be extracted which inform the consideration of the road proposals supporting the CBD core area.

- The current connectivity of industrial areas to the south of the east - west railway lines has limited access to the R300 to the east (using Strand Street interchange and the Bottelary half-diamond interchange); and
- The use of Robert Sobukwe Road – Tienie Meyer By-Pass and Mike Pienaar Avenue to access the N1 with Durban road performing a secondary role.

Figure 3 below illustrates the classified freight route.

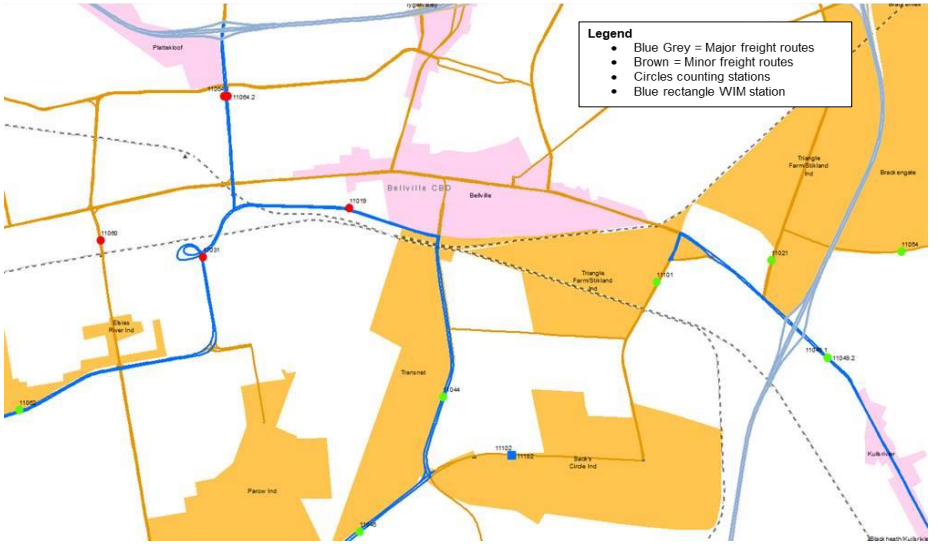


Figure 3: Classified Freight Routes (LMS)

Figure 4 also indicates two proposed freight routes captured in the Freight Management Strategy, namely Robert Sobukwe Road extension (north – south) and the Tienie Meyer By-Pass extension (original southern alignment).

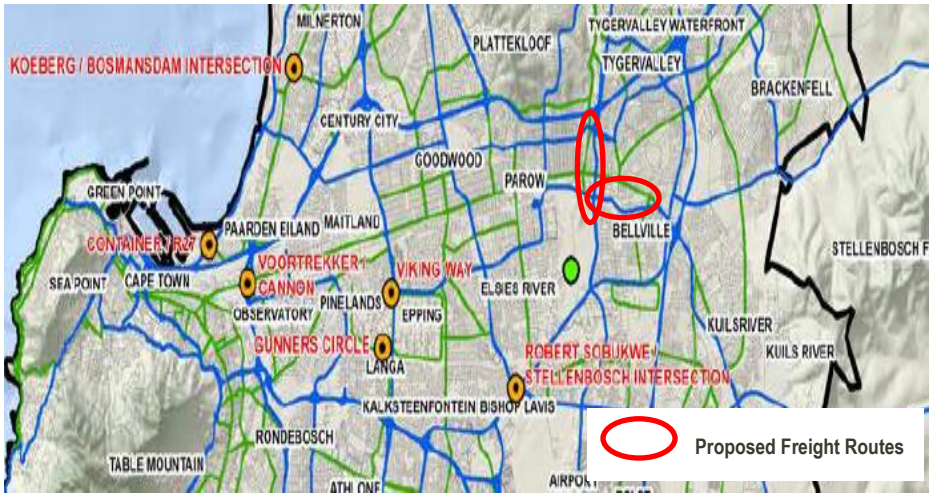


Figure 4: Proposed Freight Routes

3.3 Road Classes

Table 2 below summarises the classes of major roads reviewed within the core area and Figure 5 illustrates the City's current status of road classes.

Table 2: Major Road Classes

Road Description	Road Class
Proposed Robert Sobukwe (N/S)	Class 2
Durban Road	Class 2
Carl Cronje	Class 3
Frans Conradie	Class 2
Proposed Maree Street	Class 3
Tienie Meyer Bypass Extension	Class 2
Voortrekker Road	Class 3

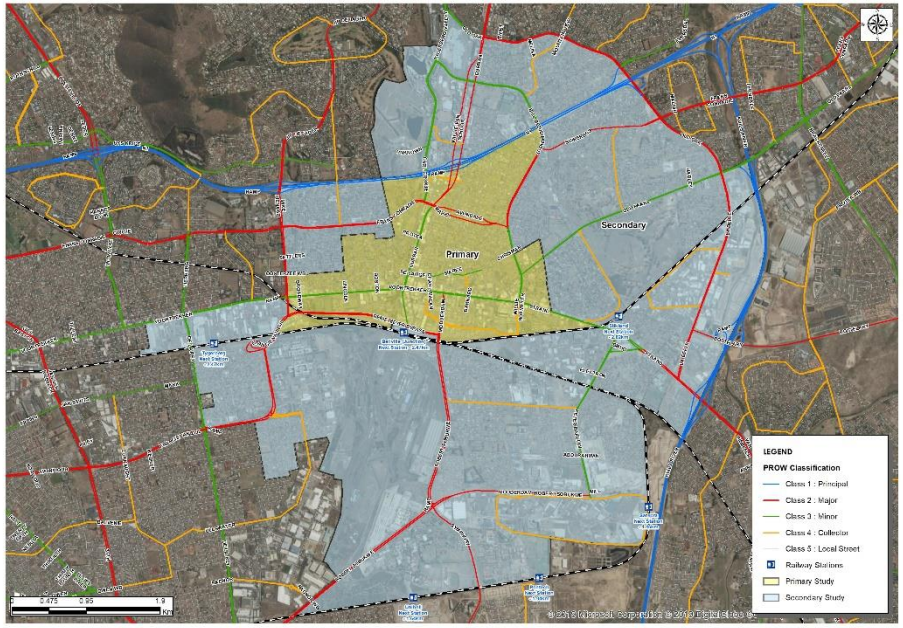


Figure 5: Road Classes

3.4 Proclaimed Roads

Figure 6 illustrates the proclaimed Main Roads traversing the Primary and Secondary study areas.

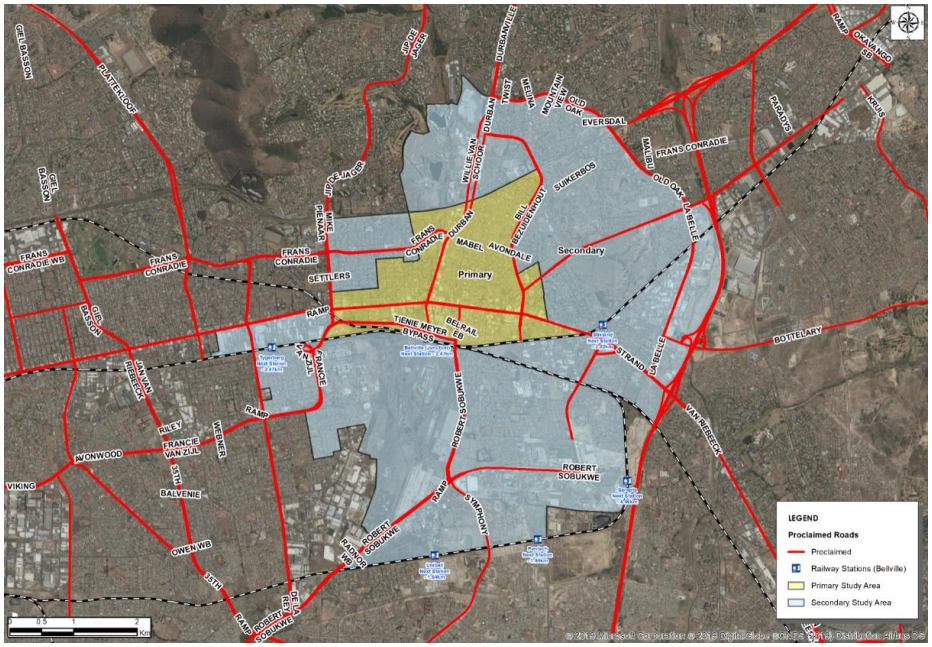


Figure 6: Proclaimed Roads

3.5 Pedestrians / Cycling

Non-motorised transport is a critical foundational movement layer to urban renewal within the Bellville CBD core area. The networks required to support urban development need to respond to urban design intentions reflected in various precinct level plans that have been highlighted.

Given the nature of the current report, this level of detail was not undertaken as part of this mandate to enable a definitive response on NMT provision to be articulated.

This aspect will need to be specifically addressed in initiatives that focus on the urban design requirements associated with the various urban precincts that have been identified.

3.6 Current Public Transport Environment

The public transport environment within the core or primary area currently accommodates an increasingly under-utilised rail infrastructure and service provision as well as an over-subscribed MBT ranking and holding facility.

Over-crowded public spaces and pedestrian walkways are present that are not conducive to an efficient and safe pedestrian environment. They also contribute to an operationally sub-optimum road based public transport interchange facility that is physically separated from the Bellville Railway Station.

Since 2008, rail patronage has significantly declined due to deteriorating rail service provision resulting from both financial and operational organisational constraints.

Contracted bus services have maintained, and even increased service levels, during the same period. The mini-bus taxi industry, on the other hand, has grown significantly, as it has rapidly responded to the market decline in the rail services being provided.

The progressive collapse of the rail service has led to an unbalanced public transport response which is increasingly hampered by road congestion.

3.6.1 Minibus Taxis

The mini-bus taxi industry plays a critical role in the movement of people through the Bellville CBD. The industry has responded to market forces and significantly increased its public transport market share in line with the steady decline of rail service provision.

The current situation at the Bellville PTI reflects a dynamic informal sector that provides primarily for peak commuting demand. No scheduled services are provided, an increasing variety of route destinations are materialising that seek to be accommodated at the PTI, while the dearth of off-peak service provision results in significant off-peak holding / parking of under-utilised fleet.

Although the routes reflected in Figure 7 indicate an apparent route coverage, this is misleading since a consistent temporal distribution of service provision is

not evident and neither is the frequency of services provided. The resultant inefficiencies in this form of public transport service provision are evident.

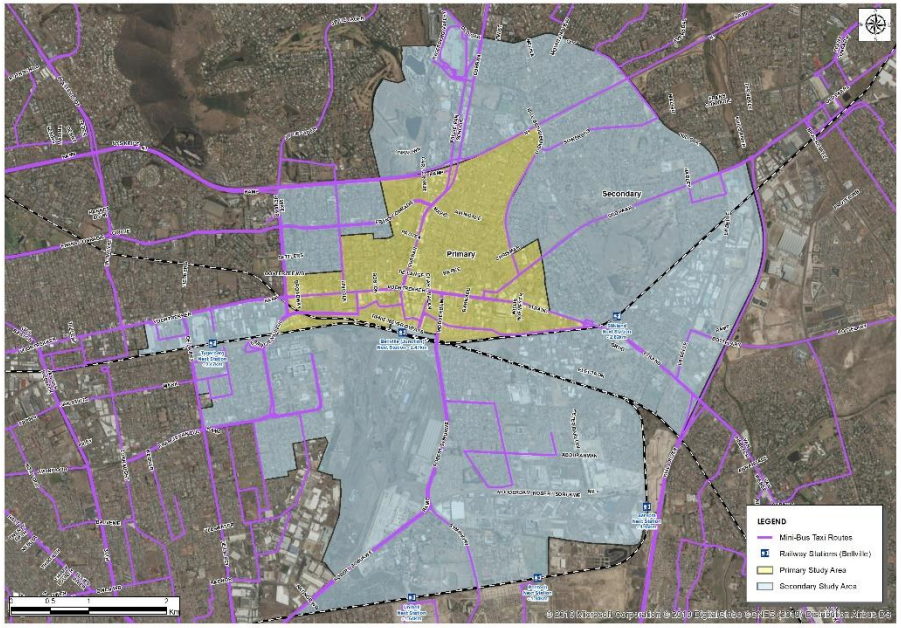


Figure 7: Taxi Routes

The range of taxi trip origins and destinations is extensive and far reaching as is illustrated in Figure 8. Many of these routes have possibly emerged as a consequence of weak or no supply of alternate public transport services including the provision of adequate inter-town services.

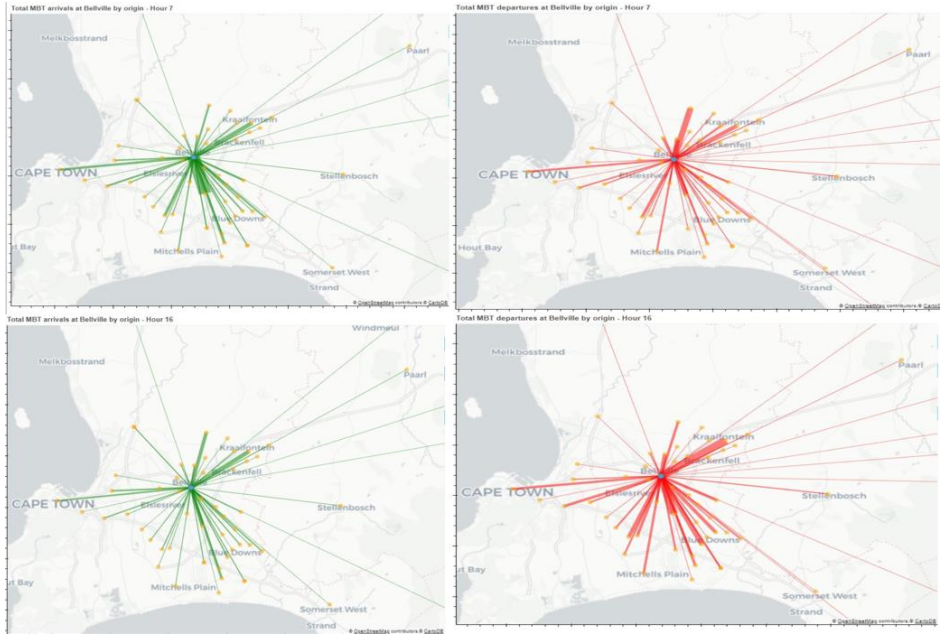


Figure 8: Distribution of Taxi Route Destinations

3.6.2 Golden Arrow Bus Services and stops

Golden Arrow Bus Services (GABS) provides contracted subsidised services with subsidy administration through the Province. Figure 9 suggests a significant spatial coverage but this intent is not carried through in terms of timetable frequencies and hours of effective operation.

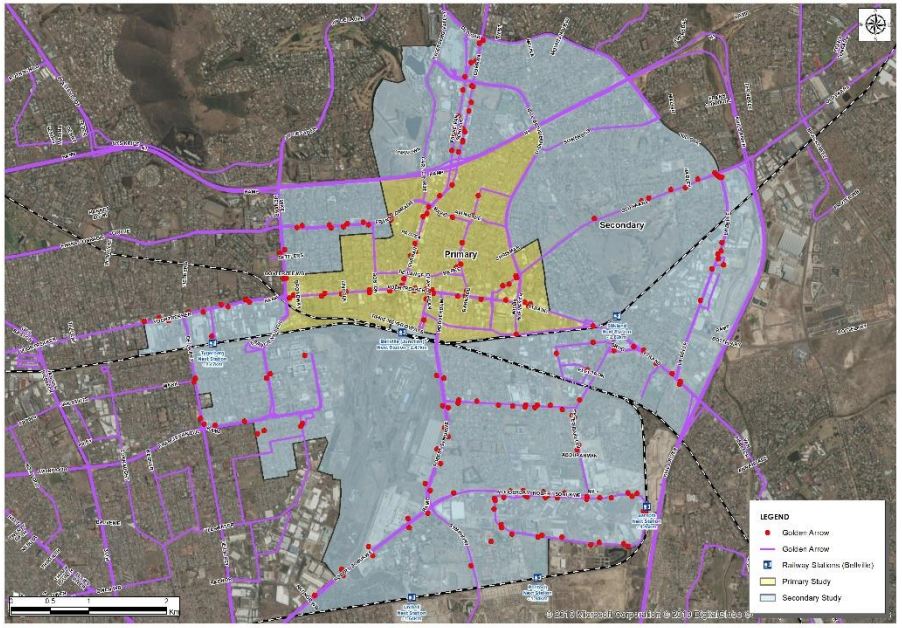


Figure 9: Golden Arrow Bus Services

3.6.3 MyCiti BRT and Community routes

No MyCiti bus services are currently operational within either the core or the secondary study area.

The IPTN implementation plan has been divided into three phases each containing a number of trunk routes. Phase 2, intended for completion by 2032, includes Trunk Route 13 (T3) linking the Metro South East, Delft, and Belhar to Stikland, Bellville, Tygervalley and Durbanville.

Trunk Route 14 (T14) (Westlake to Bellville Route) and Trunk Route 19 (T19) form part of Phase 3 which, in the IPTN Implementation Plan is scheduled for implementation beyond 2032.

Current information indicates that this timeline will not be achieved and any BRT provision to service the Study area is likely to be initiated in a fifteen-to-twenty-year time horizon (if not beyond).

The City has indicated that, once contracted bus subsidies, currently the domain of the Province, are assigned to it as a result of an application for assignment, negotiations will be initiated with GABS with a view to introducing a “Quality Bus” initiative, servicing the Durban Road corridor, that provides enhanced contracted road based public transport services under the MyCiti banner. The assignment of function does not preclude early engagement.

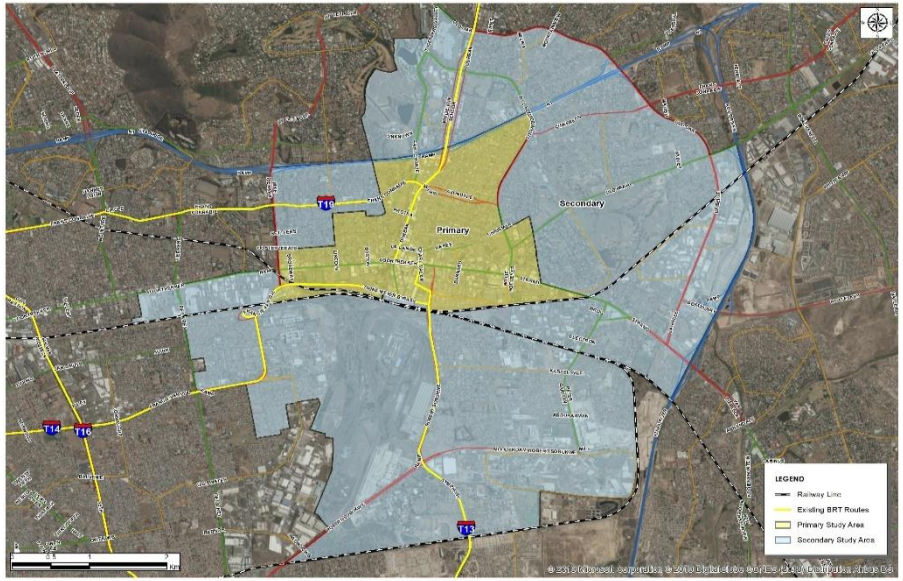


Figure 10: Proposed BRT routes

3.6.4 Rail Network

The rail network passing through, and adjacent to the Bellville CBD core area, comprises a railway network that is jointly owned by both Transnet Freight Rail

and by PRASA, and one that is mutually operated under a series of Mutual Use, Mutual Hire and Interface Agreements.

Bellville station is the second largest Station in the Metropolitan area with nine "service lines" being accommodated.

The passenger rail network passing through Bellville Station accommodating the following service lines is summarised in Table 3. An indication of the average peak period headways is also indicated.

Table 3: 2012 Passenger Rail Service Lines Through Bellville

Service Line	Description	Average Peak Period Train Head Way at Bellville Station (min / max) (2012)
4	Wellington (Kraaifontein) Cape Town via Woodstock	3 / 25
5	Bellville to Cape Town via Monte Vista	4 / 58
7	Eersterivier to Cape Town via Woodstock	4 / 32
9	Strand to Cape Town via Bellville & Woodstock	40 / 50
10	Bellville to Cape Town via Langa and Esplanade	15 / 33
11	Bellville to Cape Town via Pinelands	15 / 33
19	Wellington to Cape Town via Monte Vista	25 / 40
21	Muldersvlei to Cape Town via Stellenbosch & Woodstock	4 / 32
23	Strand to Cape Town via Monte Vista	40 / 50

(Source 2012 Rail Census)

Transnet Freight Rail lines connect from the Transnet Site to the south of Bellville Station to the Port as well as to the main line to Johannesburg with these freight lines converging immediately to the south of Bellville Station. Figure 11 reflects the rail network ownership.

PRASA is currently finalising the re-signalling of their portion of the railway network along this corridor as part of their modernisation programme.

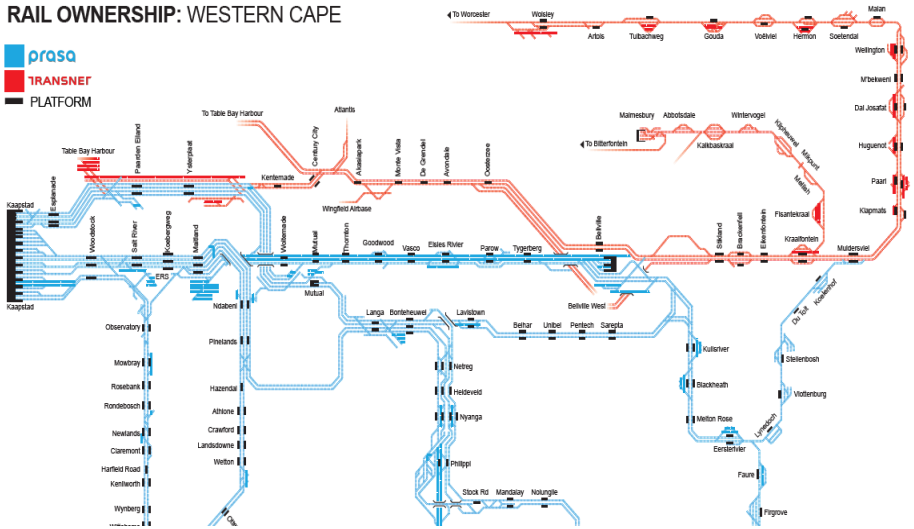


Figure 11: Rail Network Ownership

From a strategic network development perspective, PRASA has a number of proposed upgrading initiatives that will be progressed over time. Three key upgrading initiatives have been identified that will impact on the Bellville Station precinct footprint. These are:

- The potential quadrupling of the line from Bellville Station to the junction point where the proposed Blue Downs Line linking Khayelitsha to Bellville will join the Strand – Bellville line, due to:
  - The introduction of the proposed Blue Downs Line, and
  - The doubling of the Eersterivier – Strand single line
- The potential quadrupling of the section of Main Line between Bellville and Kraaifontein to accommodate the proposed Fisantekraal Line and increased freight traffic along this corridor.

These are important informants in responding to the urban development intentions associated with Bellville Station, particularly in terms of establishing

a future-proofed station footprint that dictates any envisaged air-rights developments.

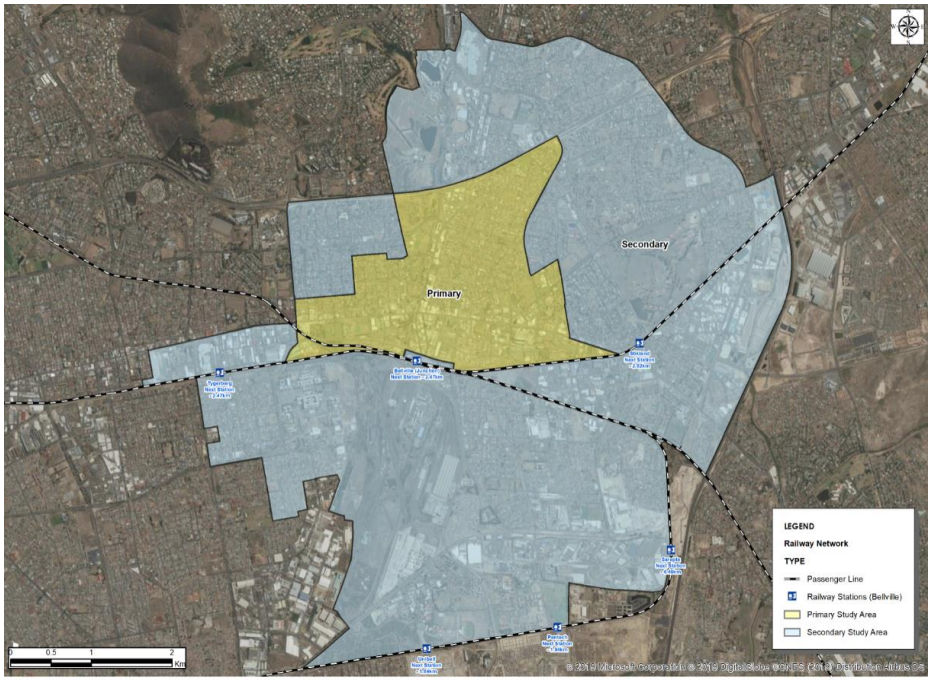


Figure 12: Rail Routes in the Context of the Study Area

3.6.5 Public Transport Accessibility

Public transport accessibility needs to be viewed through a series of "lenses" that encompass:

- Spatial (locational) allocation of the route network. Linked with this is the walkability of the catchment and an understanding of the trunk, feeder, community and local areas services that are required to service the affected area and population;
- Temporal distribution – the hours of operation during which an effective public transport service is provided, and
- Timetable frequencies – reflecting the service consistency that is provided through the hours of operation;
- Service integration which addresses ticketing, fares, timetables and passenger information.

The current situation does not address any of the above aspects of public transport accessibility, creating a vacuum in public transport service provision which is not in line with current public transport policy intentions.

Figures 13 -15 that follow, give an indication of the peak period coverage of GABS, PRASA and the future MyCiti BRT trunk services. From the data available it was not possible to examine the inter-peak and late evening situation.

The conclusion drawn is that services are generally focused on the peak periods, with few, if any, services outside these periods.

In other words, the public transport service delivery is deficient in offering levels of access that would reduce the pressure on households to own a private vehicle, let alone a second car.

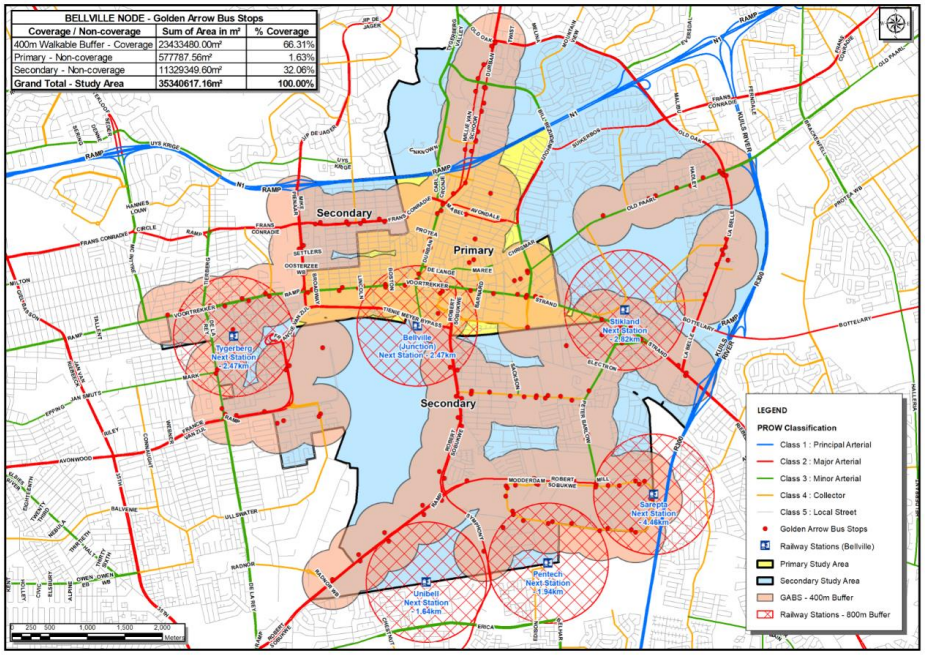


Figure 13: Golden Arrow Bus Services Coverage

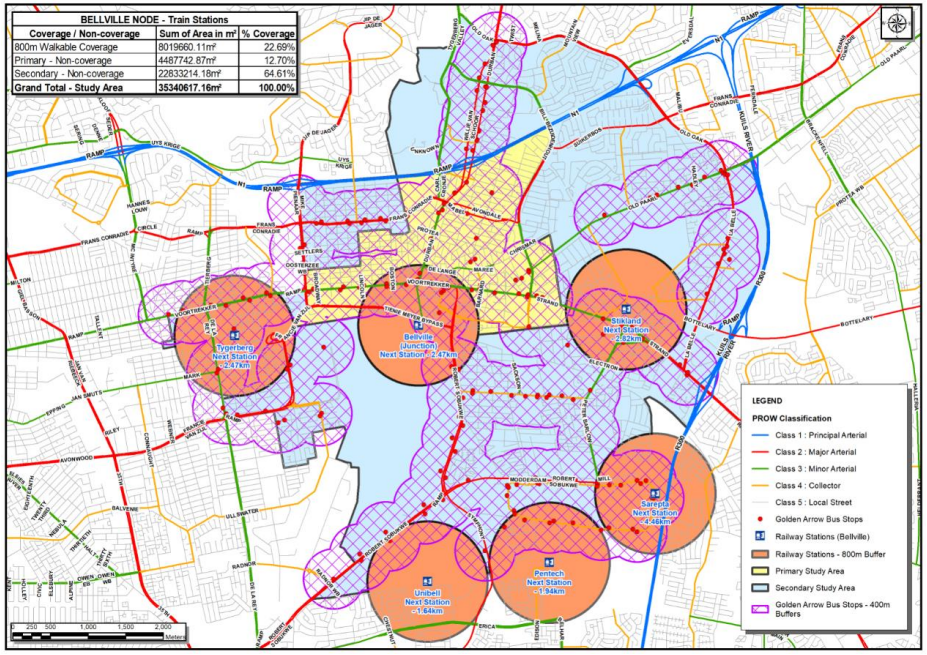


Figure 14: PRASA Station Coverage

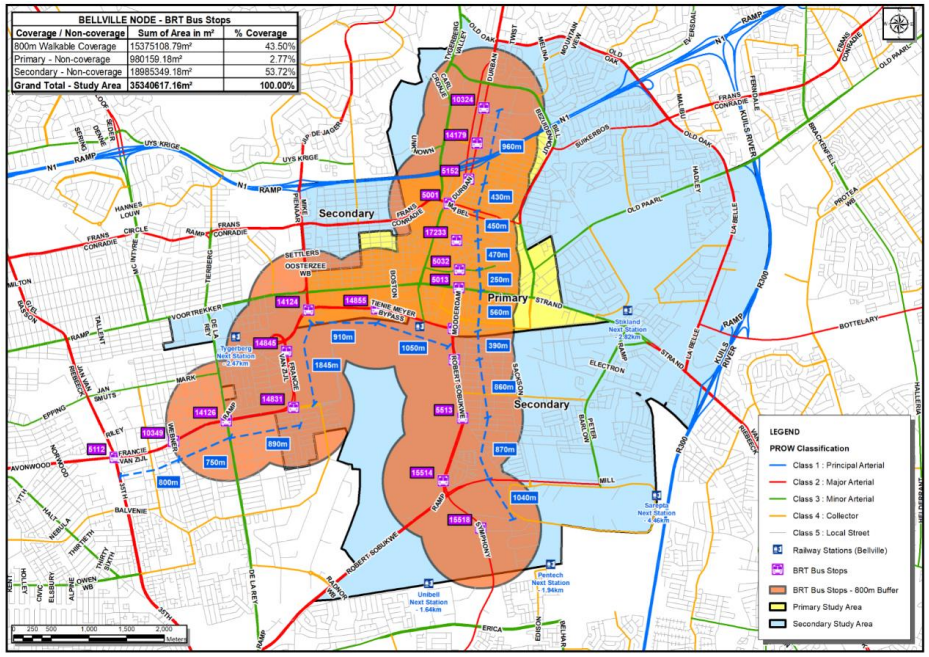


Figure 15: Envisaged BRT coverage

3.7 Data Collection

3.7.1 Approach to Survey Work

A detailed understanding of the movement system at a core (1 km radius) precinct level around the Bellville railway station and the envisaged PTI location is required. Survey data was therefore collected to enable the macro / strategic model to be calibrated and validated. The study area as confirmed by the City of Cape Town is:

- A 2 km radius transitional area centered on the Bellville Railway Station/PTI, and
- A 1 km radius core area focused on the Bellville CBD area centered around the Bellville Railway Station and current / proposed PTI locations.

The services that were undertaken for traffic surveys are full classified turning movement counts, a vehicle occupancy sample and queue lengths at key intersections.

3.7.2 Traffic Volumes

The locations of the manual surveys are illustrated in Figure 16. The manual traffic survey data was collected for the primary and secondary area. A total of 47 intersections was counted for the traffic surveys at the end of 2018 and in January / February 2019. A list of the intersections and survey information is provided in Table 4.

3.7.3 Pedestrian Volumes

The locations of the manual pedestrian surveys are illustrated in Figure 17. The manual pedestrian survey data was collected at the Bellville PTI at 20 locations during February 2019. A list of the pedestrian locations and survey information is provided in Table 5.

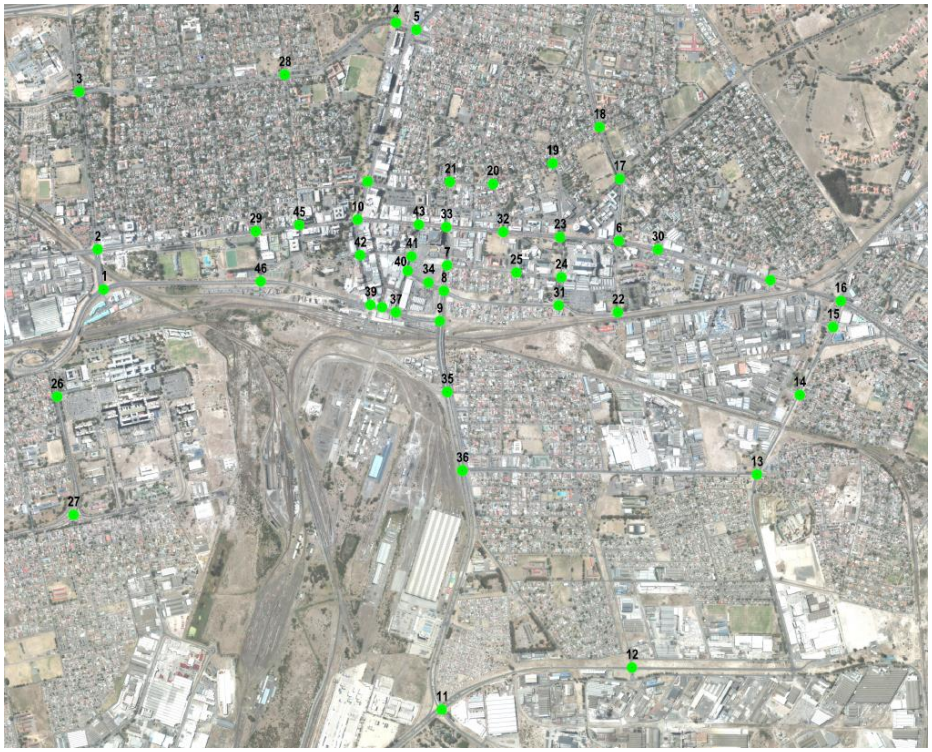


Figure 16: Location of traffic surveys

Table 4: Traffic Count Information and Locations

Survey Type	Abbreviation	Time Period
Traffic counts	TC	AM: 6:00-10:00 ; PM: 15:00-19:00
Occupancy	OCC	AM: 7:00-9:00 ; PM: 16:00-18:00
Queue Lengths	QL	AM: 7:00-9:00 ; PM: 16:00-18:00
Pedestrians	PED	AM: 6:00-10:00 ; PM: 15:00-19:00

No	Description	Type of counts	Year
1	Mike Pienaar/Tienie Meyer Bypass	TC + OCC+QL	2018
2	Mike Pienaar/Voortrekker	TC + OCC+QL	2018
3	Mike Pienaar/Frans Conradie	TC + OCC+QL	2018
4	Carl Cronje/ Frans Conradie	TC + OCC+QL	2018
5	Durban Road/ Frans Conradie	TC + OCC+QL	2018
6	Willie Hofmeyer/Strand/Voortrekker	TC + OCC+QL	2018
7	Robert Sobukwe/Voortrekker	TC + OCC+QL	2018
8	Robert Sobukwe/Belrail	TC + OCC+QL	2018
9	Robert Sobukwe/Tienie Meyer	TC + OCC+QL	2019
10	Durban/ Voortrekker	TC + OCC+QL	2019
11	Symphony/Robert Sobukwe	TC ONLY	2018
12	Iscor Street/ Robert Sobukwe	TC ONLY	2018
13	Peter Barlow/ Kasselsvlei	TC ONLY	2018
14	Peter Barlow/ Electron	TC ONLY	2018
15	Peter Barlow/ Brug	TC ONLY	2018
16	Peter Barlow/ Strand	TC ONLY	2018
17	Bill Bezuidenhout/ Old Paarl (Dirkie Uys)	TC ONLY	2018
18	Bill Bezuidenhout/ Chrismar	TC ONLY	2018
19	Maree/ Du Toit	TC ONLY	2018
20	Barnard/ Maree	TC ONLY	2018
21	Bellvue/ Vlei	TC ONLY	2018
22	Willie Hofmeyer/ Belrail	TC ONLY	2018
23	Oos/ Voortrekker	TC ONLY	2018

No	Description	Type of counts	Year
24	Oos/ Reed	TC ONLY	2018
25	Adam Tas/ Reed	TC ONLY	2018
26	M16 (Eastbound)	TC ONLY	2018
27	Francie Van Zyl/M16	TC ONLY	2018
28	Boston/ Frans Conradie	TC ONLY	2018
29	Landros/ Voortrekker	TC ONLY	2018
30	Strand/ Van Tromp	TC ONLY	2019
31	Oos/ Belrail	TC ONLY	2019
32	Barnard/ Voortrekker	TC ONLY	2019
33	Robert Sobukwe/ Reed	TC ONLY	2019
34	Belrail (entrance to Bellville Rank)	TC ONLY	2019
35	Robert Sobukwe/ Caledon	TC ONLY	2019
36	Robert Sobukwe/ Kasselvlei	TC ONLY	2019
37	Charl Malan/ Station	TC ONLY	2019
38	Blackenberg/ Church	TC ONLY	2019
39	Durban / Station	TC ONLY	2019
40	Charl Malan/ Belrail	TC ONLY	2019
41	Charl Malan/ Church	TC ONLY	2019
42	Durban/ Church	TC ONLY	2019
43	Charl Malan/ Voortrekker	TC ONLY	2019
44	Durban/ Voortrekker	TC ONLY	2019
45	Market Street/ Voortrekker	TC ONLY	2019
46	Landros/ Tienie Meyer	TC ONLY	2019

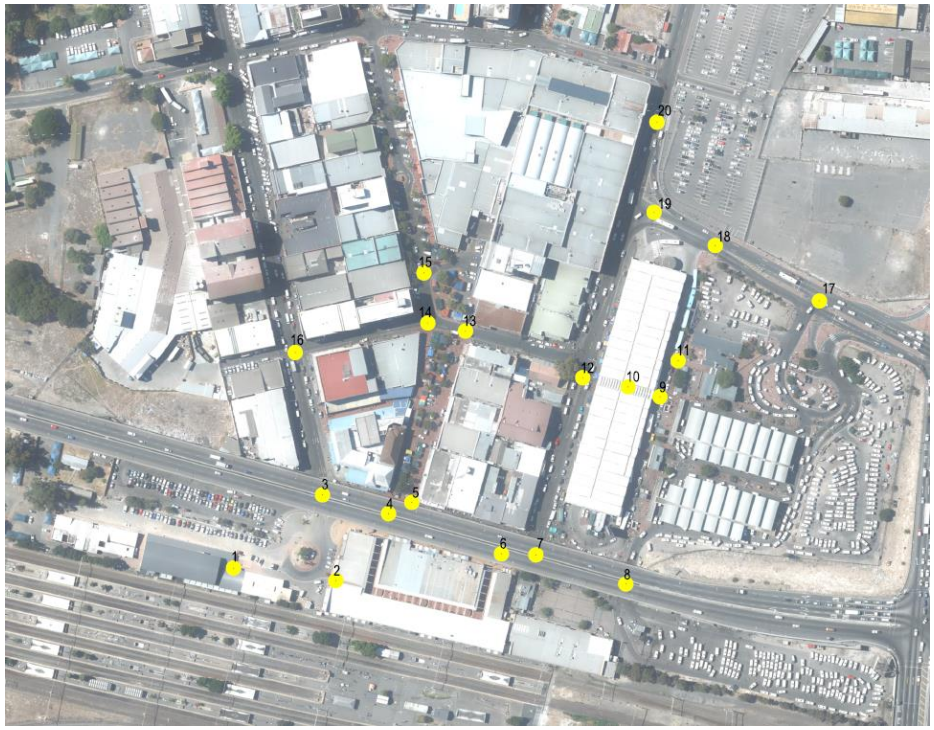


Figure 17: Location of pedestrian surveys

Table 5: Pedestrian Count Locations

No	Description	Type of counts	Year
1	Station Entrance	PED	2019
2	Mall Entrance	PED	2019
3	Durban Road/ Station Road	PED	2019
4	Station Road/Blanckenberg Street (1)	PED	2019
5	Station Road/Blanckenberg Street (2)	PED	2019
6	Mall Entrance/Station Road	PED	2019
7	Charl Malan Street/Station Road	PED	2019
8	Taxi Rank Entrance	PED	2019
9	Taxi Rank (1)	PED	2019
10	Taxi Rank (2)	PED	2019
11	Taxi Rank (3)	PED	2019
12	Wilshammer Street/Charl Malan Street	PED	2019
13	Blanckenberg Street/Wilshammer Street	PED	2019
14	Kruskal Avenue/Wilshammer Street	PED	2019
15	Kruskal Avenue	PED	2019
16	Wilshammer Street/Durban Road	PED	2019
17	Belrail Road/Bellville Taxi Rank	PED	2019
18	Taxi Rank (4)	PED	2019
19	Belrail Road/Charl Malan Street	PED	2019
20	Charl Malan Street/Mall Entrance	PED	2019

3.7.4 Public Transport Passenger Volumes

3.7.4.1 Road Based Bus Passenger Surveys

The CoCT conducts an onboard survey for the Golden Arrow Bus Service (GABS) every three years. The most recent survey was conducted in 2016. The surveys are conducted over a period of two to three months on normal weekdays (Tuesday, Wednesday and Thursday).

Every bus on every route in the network is surveyed once during this period and the information combined to represent one weekday. The surveys provide the boarding and alighting passenger numbers at stop locations.

3.7.4.2 Minibus Taxi

The CoCT have existing projects to survey the minibus taxi (MBT) ranks and conduct onboard surveys for a sample of MBTs.

The rank surveys were conducted in 2016 for a full day on a normal weekday and provide information on the ultimate destination of the MBT leaving a rank, the time of departure and vehicle occupancy at departure. The rank included in the study area is that of the Bellville PTI.

The onboard surveys were conducted by GoMetro on normal weekdays in 2017/18. The surveys provide information, for a sample of MBTs, on the route alignments, stop locations, vehicle occupancies and fare.

The GoMetro surveys will also be expanded, from the sample using rank survey information, to give an indication of the expected total passenger demand for specific locations. The information was however no available at the time of the study.

3.7.4.3 PRASA (Metrorail)

The most recent surveys conducted on the PRASA rail network in the Western Cape, is the 2012 rail census. The census data was documented in the final Rail Census Report (April 2013). Table 6 indicates the patronage trends for 2004, 2007 and 2012. Since 2012, PRASA has sustained a steady decline in patronage currently estimated to be approximately 35% of the 2012 levels.

Table 6: Rail Passengers Trends by Service Lines

Corridors	2004 (3 hour AM peak period)			2007 (3 hour AM peak period)			2012 (3 hour AM peak period)		
	Metro Plus	Metro	Total	Metro Plus	Metro	Total	Metro Plus	Metro	Total
1 Simonstown to Cape Town	12,375	10,875	23,250	10,395	9,135	19,530	10,890	9,570	20,460
2 Retreat to Cape Town via Maitland	4,680	7,140	11,820	4,290	6,545	10,835	4,680	7,140	11,820
3, 4, 19 Wellington to Cape Town	9,000	10,650	19,650	4,200	4,970	9,170	7,800	9,230	17,030
5 Bellville to Cape Town via Monte Vista	1770	550	2,320	4,425	1,375	5,800	6,195	1,925	8,120
6, 7, 21 Muldersvlei to Cape Town	7,800	9,230	17,030	4,800	5,680	10,480	4,800	5,680	10,480
8, 9, 23 Strand to Cape Town	3,000	3,550	6,550	3,600	4,260	7,860	4,200	4,970	9,170
10, 11 Bellville to Cape Town	1,050	12,810	13,860	1,050	12,810	13,860	1,050	12,810	13,860
13, 14 Kapteinsklip to Cape Town	3,450	42,090	45,540	2,550	31,110	33,660	2,400	29,280	31,680
15, 17 Khayelitsha to Cape Town	1,760	44,500	46,260	2,720	39,100	41,820	3,360	48,300	51,660
Total			186,280			153,015			174,280

Table 7 indicates the service lines to Cape Town that are associated with Bellville Station (highlighted) as well as the periods of operation.

Table 7: Metrorail Service Lines

Service lines to Cape Town						
Line	Description	04:30 – 06:00	06:00– 09:00	09:00- 16:00	16:00- 19:00	19:00 - 21:30
1	Simonstown to Cape Town	Yes	Yes	Yes	Yes	Yes
2	Retreat to Cape Town via Maitland	Yes	Yes	Yes	Yes	Yes
4	Wellington to Cape Town via Woodstock	Yes	Yes	Yes	Yes	Yes
5	Bellville to Cape Town via Monte Vista	Yes	Yes	Yes	Yes	Yes
7	Eersterivier to Cape Town via Woodstock	Yes	Yes	Yes	Yes	Yes
9	Strand to Cape Town via Bellville and Woodstock	Yes	Yes	Yes	Yes	Yes
10	Bellville to Cape Town via Langa and Esplanade	Yes	Yes	Yes	Yes	Yes
11	Bellville to Cape Town via Pinelands		Yes			
13	Kapteinsklip to Cape Town via Pinelands and Woodstock	Yes	Yes	Yes	Yes	Yes
14	Kapteinsklip to Cape Town via Mutual and Esplanade	Yes	Yes	Yes	Yes	Yes
15	Khayelitsha to Cape Town via Mutual and Esplanade	Yes	Yes	Yes	Yes	Yes
17	Khayelitsha to Cape Town via Pinelands	Yes	Yes	Yes	Yes	
19	Wellington to Cape Town via Monte Vista		Yes			
21	Muldersvlei to Cape Town via Stellenbosch and Woodstock	Yes	Yes	Yes	Yes	Yes
23	Strand to Cape Town via Monte Vista	Yes	Yes		Yes	Yes
A	Worcester to Cape Town via Wellington and Monte Vista	Yes	Yes			
B	Malmesbury to Cape Town via Fisantekraal and Monte Vista	Yes	Yes			

4. Land Use

4.1 Overview of Bellville Area: Growth, Land Uses and Activities

The Bellville CBD and its surrounding residential suburbs are situated 25 km outside of the centre of Cape Town along the N1, at the cross roads of the existing east-west Voortrekker Road Activity corridor and the emerging Symphony Way north-south activity route.

This study focusses on the Bellville Central Area to the south of the N1, centered around the Bellville Station and the activities taking place along Voortrekker and Durban Road.

The Transnet site to the south of the railway line, and its future intentions remain unclear, although Transnet is in the process of reviewing its master plan for the site. The outcome of this process will not be completed in time to form a constructive informant to this study.

Some 100,000 students are reportedly registered in the three local universities and other tertiary institutions that lie within a five-kilometre radius of the Bellville inner city.

A number of hospitals and medical facilities are also located within this area.

The area's population is largely characterised by an older, employed population with a slightly higher than average citywide income and relatively smaller household sizes (CCT, 2012). The Bellville catchment has an above average number of individuals that hold postgraduate degrees, which has translated to above average disposable incomes.

The Bellville property market is dominated by street-front retail. Informal street front retail activity is concentrated at the multi-nodal PTI as well as along significant pedestrian corridors.

The take-up of 'A' grade office space within the Bellville central area over the past few years has been in the region of 6 000m^2. It is worth highlighting that a

node such as Century City has experienced an average take-up of prime office space of approximately 13 442m^2 per annum (Viruly, 2015).

Larger industrial spaces appear to be in higher demand than lighter and smaller rental units, reflective of the trend in increased warehousing and logistics activities (CCT, 2012).

Bellville's historic business center was clustered around large institutional headquarters and a substantial concentration of public service sector institutions and activities. However, the prominence of the Bellville CBD core as an economic hub eroded following the northward shift of development and commercial activity towards Tyger Valley. As a result, land values abutting Voortrekker Road have largely declined due to poor performance and the historic Bellville CBD is now often perceived as a somewhat gritty and unsafe environment.

Since 2006, office take-up has been in decline and, despite its mix of building typologies, social amenities and other assets, private sector investment has not been forthcoming, for reasons other than zoning (which is quite diverse) or large-scale transport infrastructure. The design and quality of public space plays a large part in this.

Despite these drawbacks, the Bellville CBD retains many of the elements of a CBD with an energy that can be considered an asset if it can be nurtured and channeled in support of a form of urban renewal that attracts investment and activity while being inclusive of current users.

4.2 Purpose of Land Use Assumptions

A fundamental understanding of the land use and associated activities is essential for determining, *inter alia,* the associated movement patterns that are generated as a result of these activities. This understanding, in turn, informs and guides transportation responses that are required to support the economic activity embedded in the land uses envisaged.

The process of land use assumption determination, derivation methodology and outcomes are indicated to summarize the land use inputs that have been adopted as part of the Bellville CBD Transportation Master Plan Framework.

The focus is on land development relative to densification potential to support the City of Cape Town's densification intentions. This focus, when viewed through a macro transport modelling lens, begins to frame the anticipated infrastructure spend in the area.

It is important to note that an identification of urban design and town planning responses and intentions for integrating public transport infrastructure and associated TOD land uses do not form part of this process. It therefore does not deal with other issues such as urban design interventions, open space provision and parks, as these concepts have mostly been developed in other documentation.

4.3 Land Use Assumptions Methodology

In order to provide inputs into the Bellville transportation model certain land use assumptions were required to inform future land use intensities of activities and the impacts of densities along strategic transport activity corridors.

The section below sets out the methodology and steps that were taken towards the determination of future land uses for the Bellville Study Area.

Step 1: Determining the Study Area

The basis of the land use appraisal was governed by the existing City of Cape Town EMME transport model zones as well as the transportation master plan framework primary (core) and secondary study areas. The traffic zones were reviewed and sub-divided to provide a finer zoning more appropriate to the study area. The revised traffic zoning system associated with the primary and secondary study area for the Master Plan Framework comprised thirty-seven zones for which land use assumptions were required.

The study area, based on these informants, was further differentiated by defining a primary and secondary study area – to distinguish between areas of more detailed versus less detailed.

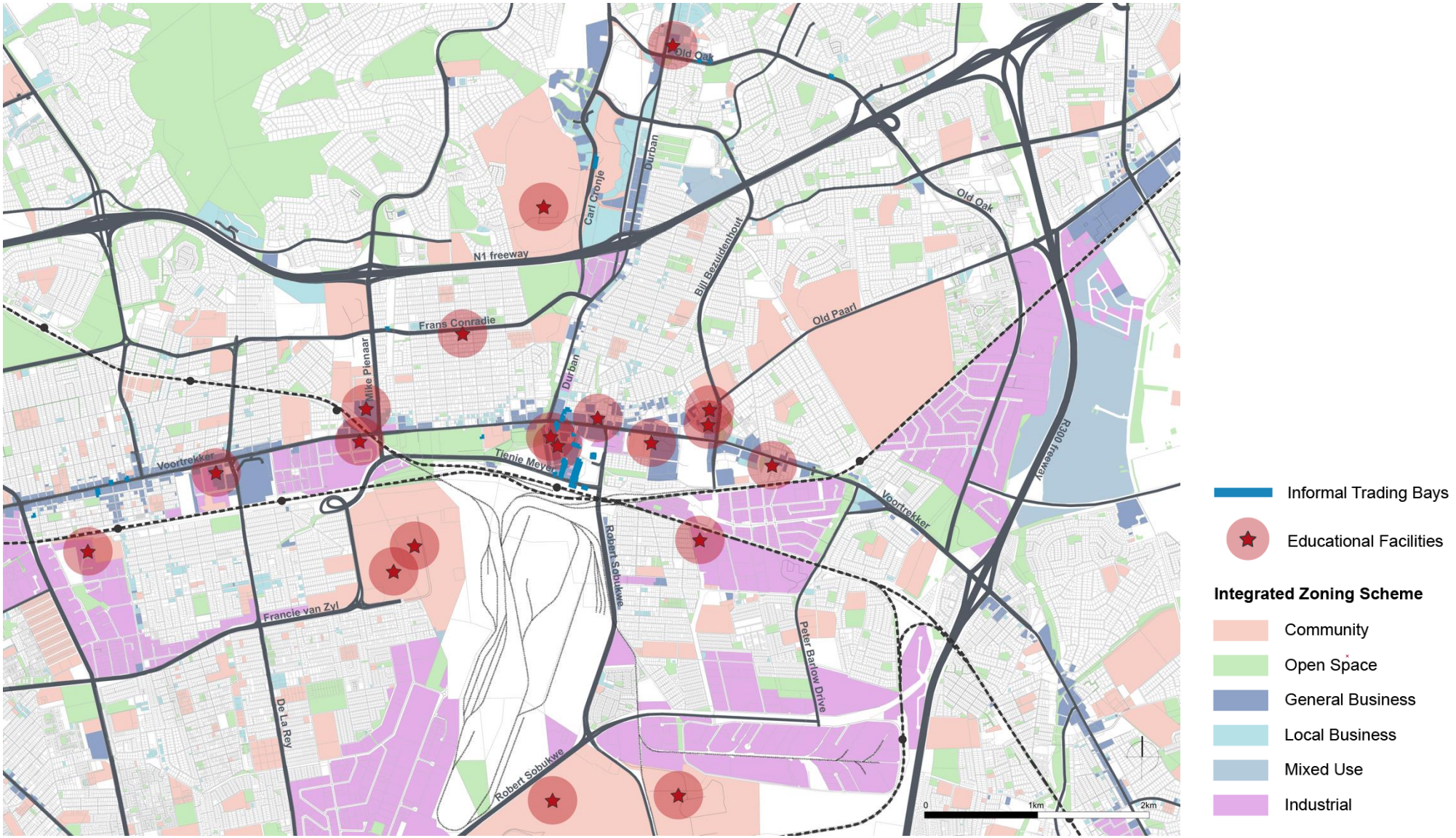


Figure 18: Land uses, zoning and educational activities in the Study Area

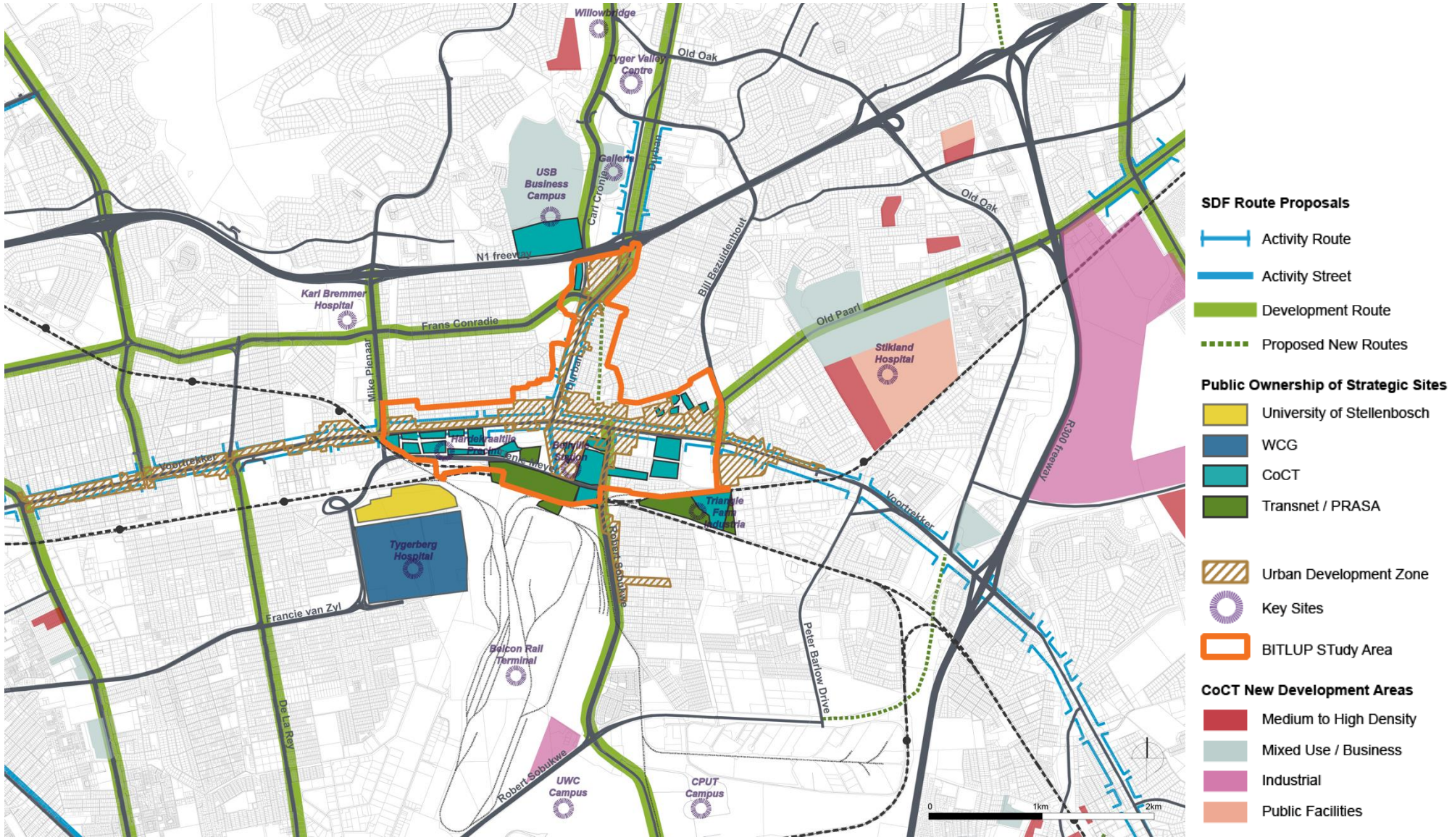


Figure 19: Development informants and ownership

Step 2: Review of Key Land Use and Development Informants

The next step involved a review of existing documents and reports, as well as existing proposals and development frameworks that could potentially have an impact on the future land use and urban growth of the Bellville central area.

This involved assessing strategic frameworks, private and public, as well as a micro-assessment of existing development proposals in terms of its land use, bulk and activity predictions (briefly exploring but without going into details such as urban design interventions).

Discussions were held with city officials regarding significant current development applications as well as future visions for the area. Critical sites were identified based on the implications of their scale and associated proposals on the study area. Based on the identification of these catalytic key sites it was decided that all of these sites, even those falling outside of the primary study area, will be included in the modelling process.

After determining the study area and a desktop review of existing informants, the following steps were taken towards the identification and endorsement of the required land use assumptions:

Step 3: Assessment of Existing IPTN PTOD Model

As part of the City of Cape Town's 2013 IPTN a "Land Use Model' was developed as the land use component to locate and quantify spatial growth estimates as an informant to other City activities. Equal focus was placed on residential growth (trip origins) and the growth of employment-generating land uses, i.e. office, retail and industrial (trip destinations / generators).

The Pragmatic TOD Model (PTOD) was investigated and used as a baseline informant to the modelling of transport and land use activities for the area.

Step 4: Assessment of BITLUP Model Proposals

The BITLUP project involved a process of modelling future densities at a detailed scale for the central core area of Bellville. The BITLUP zones form a sub-set of the proposed Master Plan Framework Core area. These densities were compared to the PTOD densities.

Step 5: Combination of Key Informants, PTOD and BITLUP Proposals

A process of updating the PTOD model with more recent development frameworks and proposals was undertaken, whereby the PTOD model was tweaked based on quantifiable future proposed densities and GLA.

This formed the baseline model from which the Master Plan Framework density and GLA proposals were extracted and finalised for an "end state" period. (The use of the term "end state" refers to an unspecified time horizon period to overcome the difficulties that present themselves with intermediate period land use development rates).

Step 6: Consolidation of Projections

Various workshops were held to discuss, and debate, proposed densities and GLA growth with city officials and other key stakeholders, after which the outcomes of these discussions were consolidated into a land use model for each of the transport zones based on the PTOD model method. The model was captured in a spreadsheet format as well as shapefile data to inform the transportation modelling process.

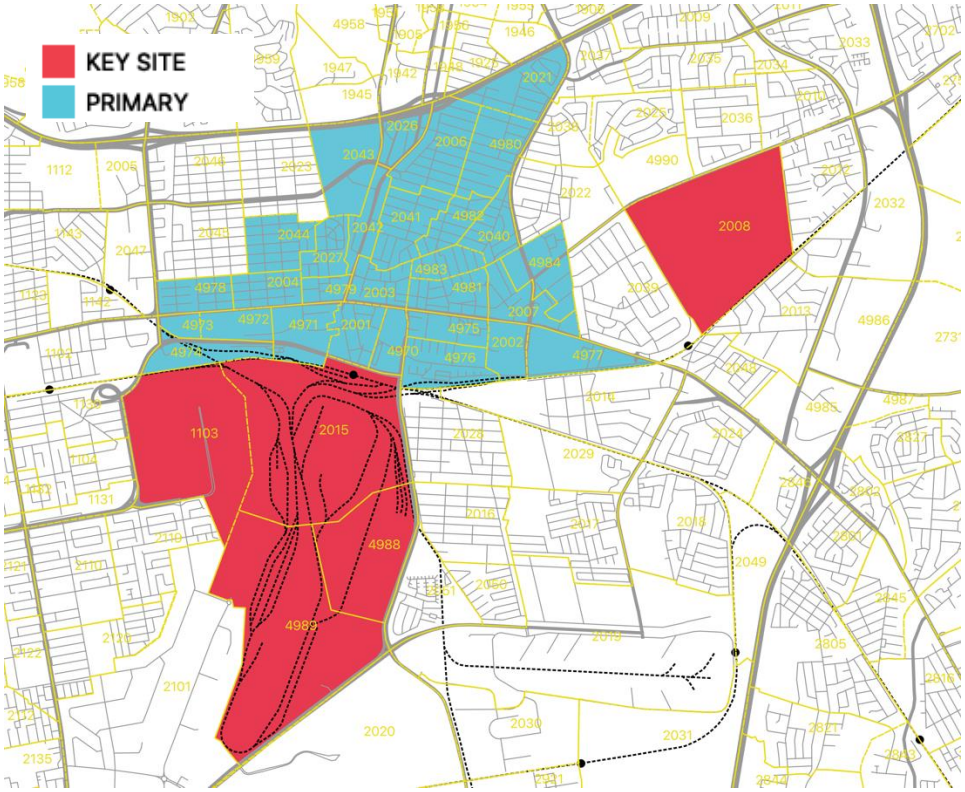


Figure 20: The Primary Transport Zones (in blue) as well as the key sites (in purple) that are not within the primary study area that were analysed for the purposes of determining land use assumptions for the model

4.4 Review of Key Land Use and Development Informants

A number of significant planning and development initiatives have taken place or are underway within the sub-metropolitan context of the Bellville CBD, which could ultimately have a direct impact on the future growth of the Bellville node. These include:

1. Bellville Integrated Transport and Land Use Plan (BITLUP) (2016)
2. TOD Opportunities Investigation for the Bellville Station Precinct (April 2016 - as part of the BITLUP Study)
3. Proposals for the Upgrading of the Bellville Transport Interchange
4. Second runway for the Cape Town International Airport
5. Blue Downs Rail Link Corridor
6. Future MyCiTi (BRT) system expansion
7. UWC Campus development and CPUT Campus Masterplan
8. Galleria Velodrome and Tygervalley redevelopment
9. Bellville Container Terminal Land Use Master Plan (Feb 2010 – currently no status)
10. Hardekraaltjie Urban Design Framework (June 2017)

Collectively, these initiatives (spatialized in Figure 21) will result in the dramatic transformation of the local and wider sub-metropolitan context of the Bellville CBD. These changes could increase the range and types of redevelopment opportunities within the Bellville CBD area.

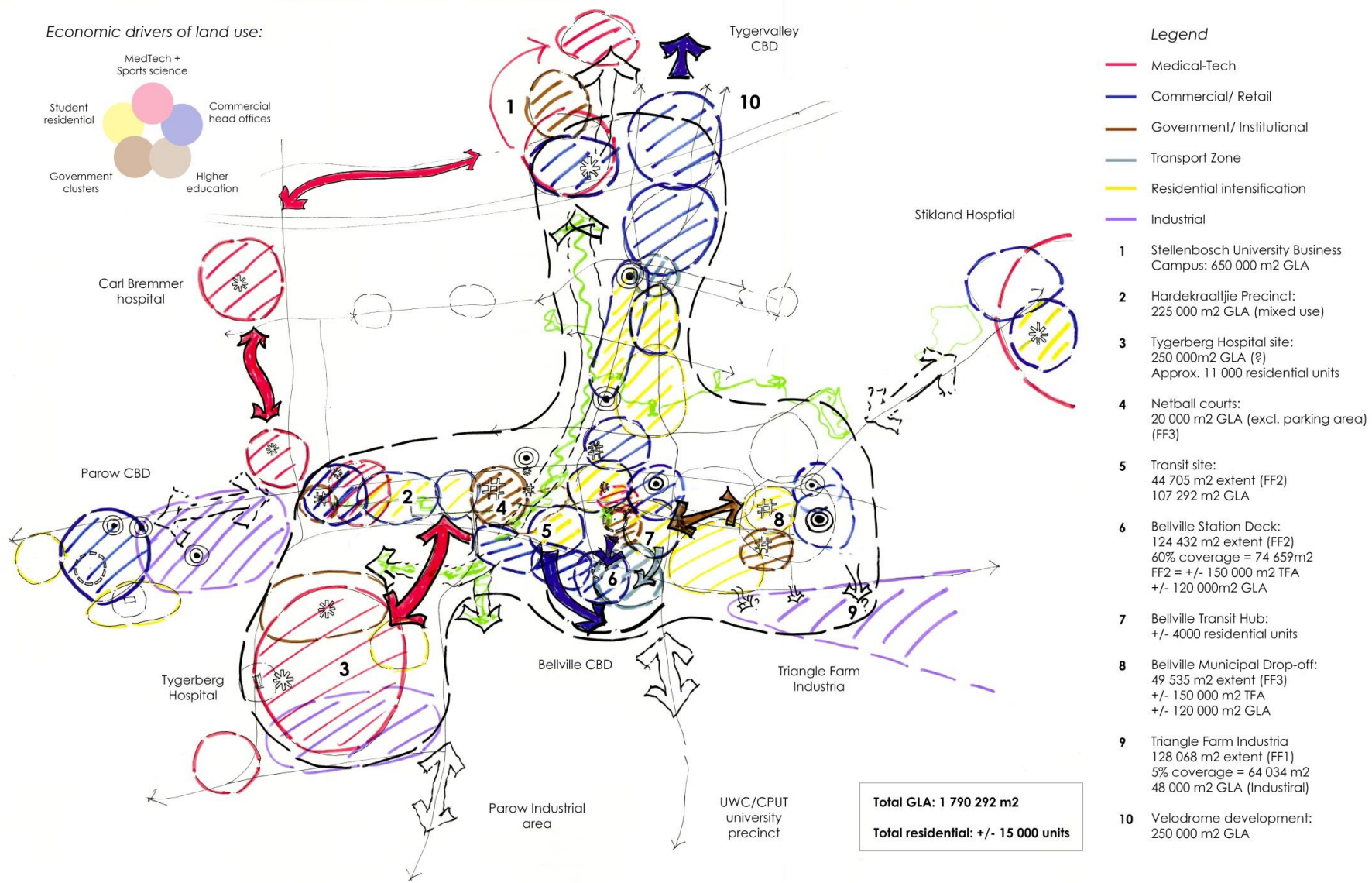


Figure 21: Land use and development informants within the study area

4.5 Determining Future Densities

4.5.1 Assessment of the PTOD Model

The City's IPTN Land Use Model consisted of three different **land use scenarios**, of which the **Pragmatic transit-orientated development (PTOD)** was used as the baseline data for the purposes of this study.

The scenarios differ in terms of their assumptions concerning residential density / intensity of land use and the spatial location of different land uses in relation to each other. Each scenario identifies household as well as GLA increase by for a horizon period of 2032.

In general, the PTOD Model scenario proposed lower likely densities due to the fact that the model does not account for recent development intentions as listed in Section 4.

Consequently, and jointly with the City's land use officials, the PTOD Land Use Model was modified based on certain assumptions that were known to the team at the start of the project process.

The table below sets out the format in which the PTOD data was captured for the purposes of a baseline data set for the modeling process. An example is set out in Table 8:

Table 8: Illustrative format of Land Use Assumptions Adopted in the PTOD Study

Transport Zone No.	PTOD 2032			PTOD Amended 2040		
	PTOD HHs (units)	PTOD Density (du/ha)	PTOD EMPL (GLA)	PTOD A HHs (units)	PTOD A Density (du/ha)	PTOD A EMPL (GLA)
2001	441	25	101 446	861	49	120 550
2007	408	29	100 018	801	56	110 000
4972	0	0	14 275	700	49	59 175

4.5.2 Assessment of BITLUP Model

The BITLUP project went through a process of identifying densities for certain portions within the core Bellville Central Area. These "precincts" differ from the transport zones that have been used as the baseline modelling format in the current study and it was, therefore, not possible to make a direct comparison between the BITLUP and PTOD predictions.

However – for the transport zones that fell within the BITLUP study area, the proposed densities were compared and then populated into the model – an example is set out in Table 9 below.

Figure 22 illustrates the BITLUP precinct areas versus the transport zones.

Table 9: Transport Zones within BITLUP study area

Transport Zone No.	BITLUP	
	Precinct No.	Precinct Density (du/ha)
2001	**4**	71
2002	**3**	66
4972	**6**	61

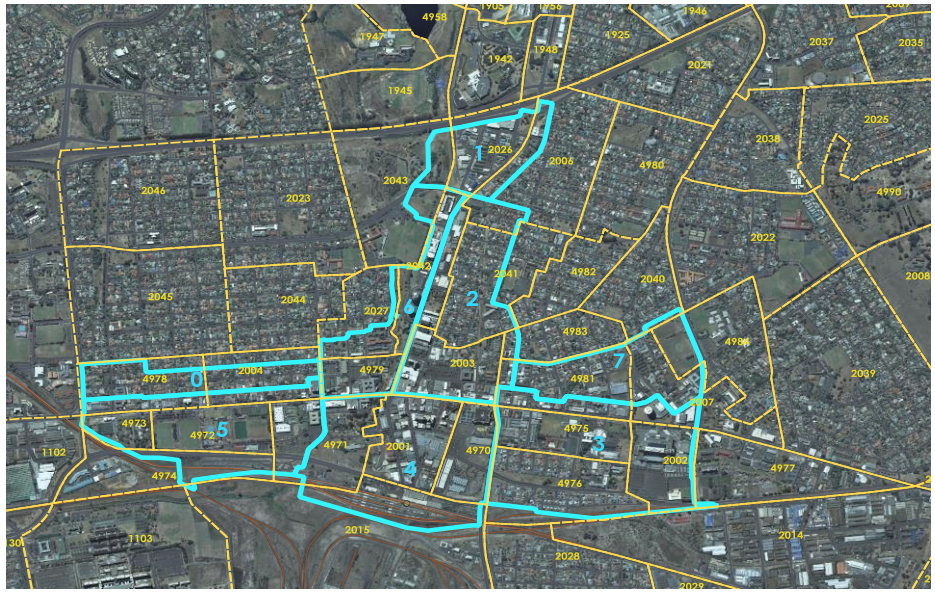


Figure 22: BITLUP Precincts (in blue) versus the Transport Zones (in yellow) used for the study area's modelling

4.5.3 Key Sites Proposals

The following key sites were identified and had additional land use data as inputs into the model due to the fact that existing or draft proposals were available at the time that the modelling was undertaken:

- Bellville Container Terminal (Land Use Master Plan Feb 2010 – currently no status)
- Bellville Station Precinct (TOD Opportunities Investigation for the Bellville Station Precinct April 2016 - as part of the BITLUP Study)
- Hardekraaltjie (Urban Design Framework June 2017)

The table below sets out the densities and employment proposals captured from the available frameworks:

Table 10: Density & Employment Proposals in Current Available Frameworks

Transport Zone No.	Existing Proposals			
	Site Title	PTOD HHs (units)	PTOD Density (du/ha)	PTOD EMPL (GLA)
4970	Station Precinct	1946	161	41 400
4972	Hardekraaltjie	4511	319	160 000
2015	Bellville Container Terminal	0	0	1 070 000
4988				
4989				

4.5.4 Combining Information into a Modified PTOD Model

By reviewing the available data for each transport zone, and considering density targets from city reports and policies, an envisaged TOD density, based on international best practice, was applied to each site. The envisaged TOD density varied depending on the types of land uses currently on the site as well as the longer-term possibilities envisioned.

These densities range from 30 du/ha (more residential or industrial areas) to a maximum of 125 du/ha (the optimal TOD density for strategic areas within the precinct). Figure 23 illustrates the densities as applied to each transport zone.

Appendix 1 provides more detail regarding the applied density assumptions for each transport zone.

4.5.5 Final Assumptions

Although Cape Town has very low relative densities across the metropolitan region, it is a well-established imperative throughout the world and in all of Cape Town's planning and development strategies and policies, that much higher residential densities are needed.

These higher-density scenarios are, however, dependent on infrastructure supply capacity and are not always achievable.

Accordingly, through various discussions with City officials, stakeholders and other members of the project team, a long term "end state" optimal density for each transport zone was identified and endorsed for the purposes of the model. This is captured in **Appendix 2** in Table format – and summarized in Table 11 below. Figures 24-25 spatializes the densities and GLA proposals to highlight the areas of higher intensity activity to support transport corridors and TOD opportunities.

The final land use assumptions lead to the following end state:

45 341 additional households within the primary study area and additional key sites

Average density of 40 dwelling units per hectare

2,156 million additional GLA m^2

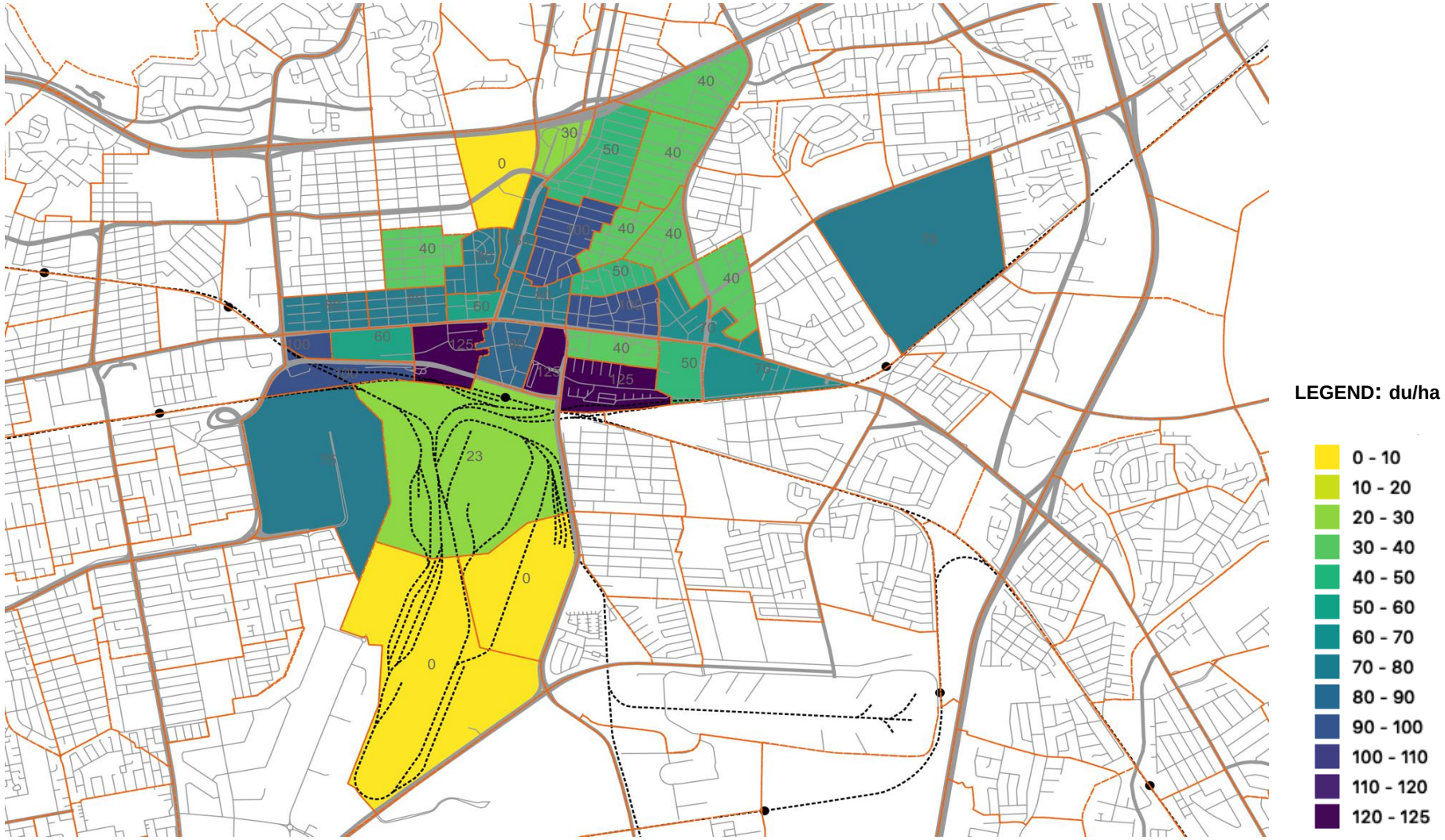


Figure 23: Initial modified TOD and Headland assumption densities applied to each transport zone

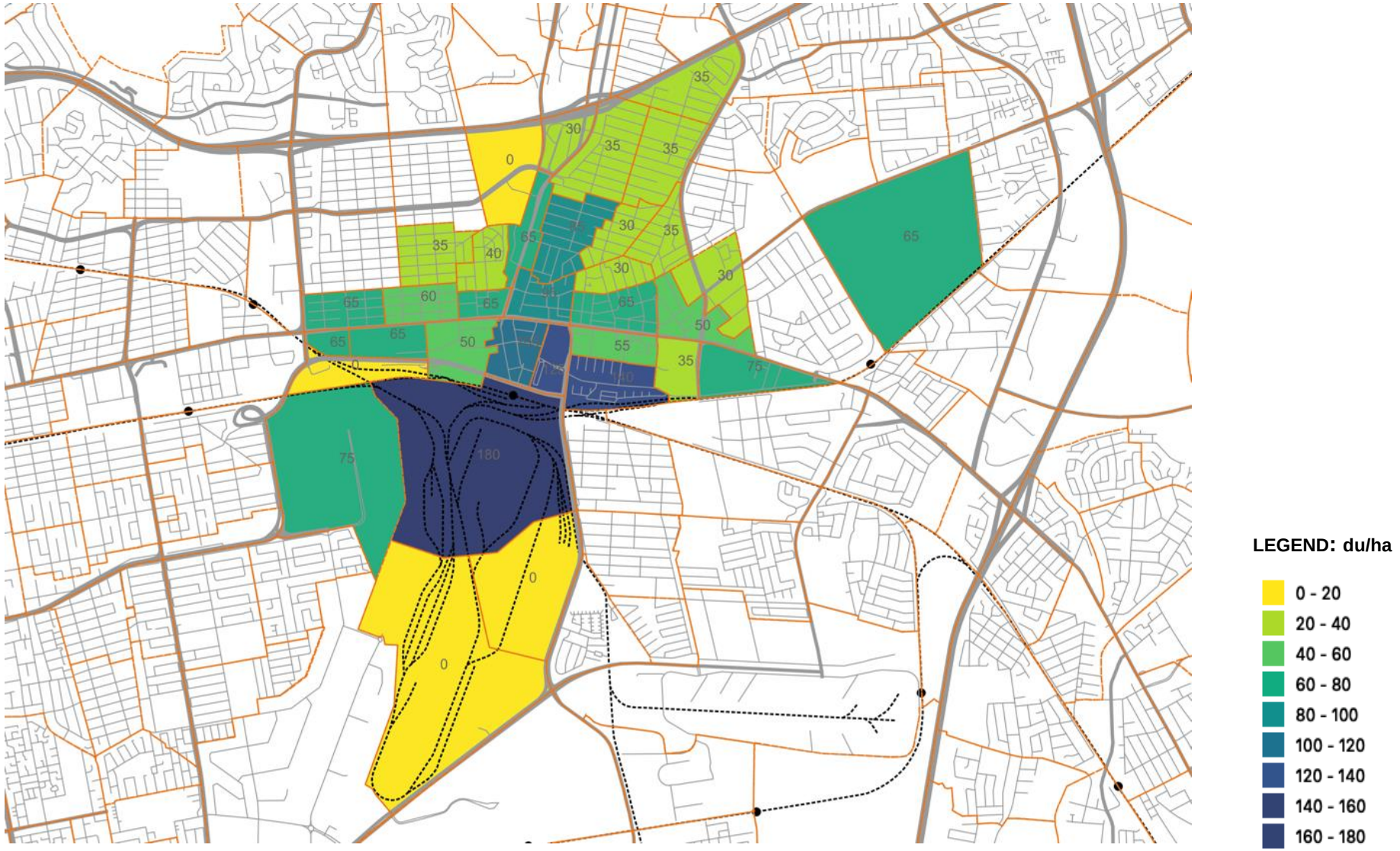


Figure 24: Final Land use household assumptions

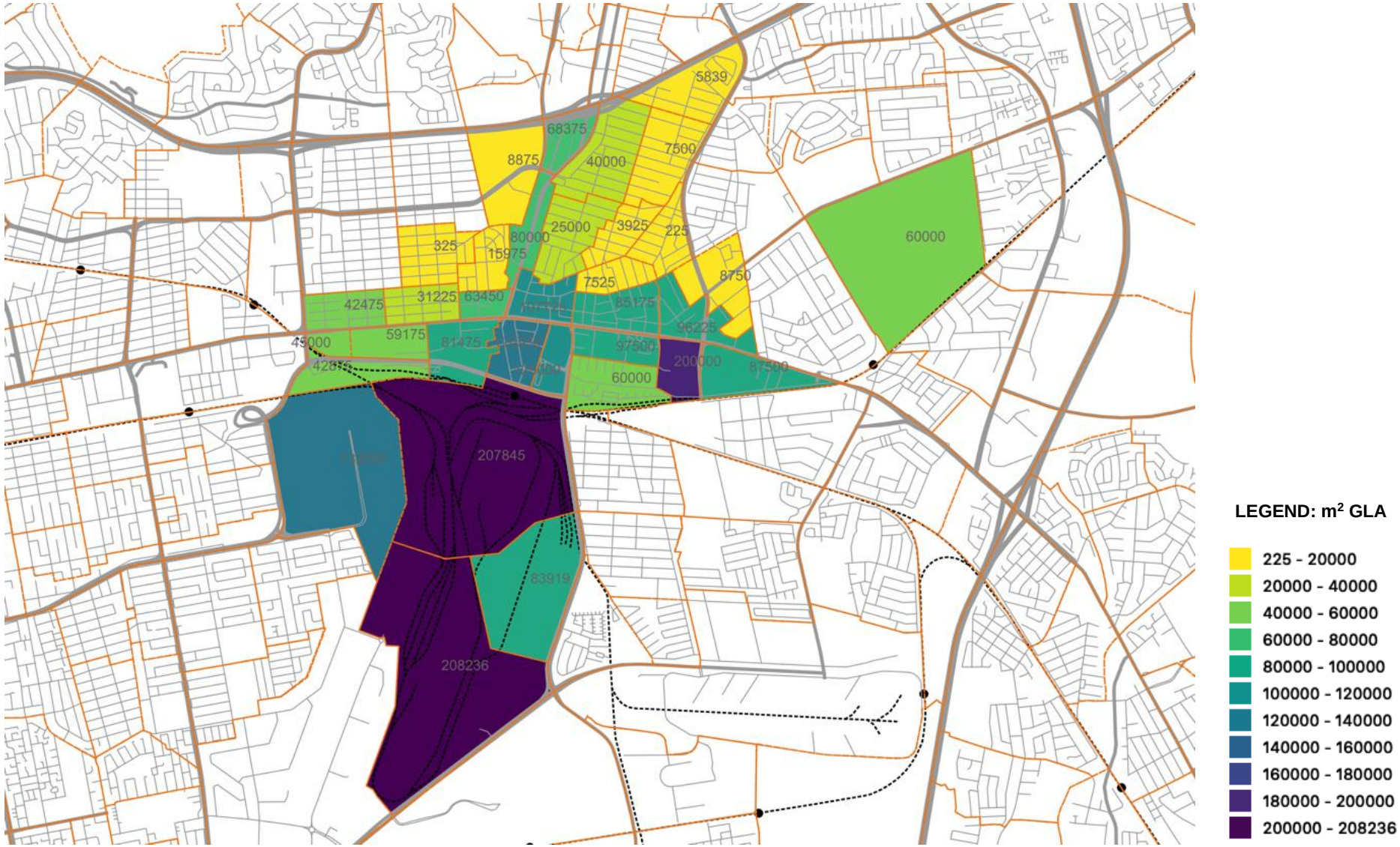


Figure 25: Final Land use employment assumptions

Table 11: Final Land Use End State Breakdown

Transport Zone No.	Final Land Use Assumptions		
	HHs (units)	Calculated Density (du/ha)	EMPL (GLA)
2001	1857	105	120 550
2002	498	35	200 000
2003	1518	95	107 725
2004	940	60	31 225
2006	1173	35	40 000
2007	1035	50	96 225
2021	1031	35	5839
2026	415	30	68 375
2027	583	40	15 975
2040	592	35	225
2041	2177	85	25 000
2042	960	65	80 000
2043	0	0	8875
2044	794	35	325
4970	1508	125	120 000
4971	1123	50	81 475
4972	920	65	59 175
4973	377	65	45 000

Transport Zone No.	Final Land Use Assumptions		
	HHs (units)	Calculated Density (du/ha)	EMPL (GLA)
4974	0	0	42 875
4975	804	55	97 500
4976	3516.8	140	60 000
4977	1807.5	75	87 500
4978	1108.9	65	42 475
4979	507	65	63 450
4980	991.55	35	7500
4981	1303.9	65	85 175
4982	425.7	30	3925
4983	351	30	7525
4984	752	30	8750
1103	8260	80	183 457
2015	3420	180	207 845
4988	0	0	83 919
4989	0	0	208 236
2008	4593	65	60 000
TOTALS	**45 341**	**40 (average)**	**2 156 121**

4.5.6 Public Transport and Land Use Density

Land Use density has a marked effect on public transport policy responses required as well as on the economic effectiveness of public transport services that are provided. Conversely, without public transport being present, there is little prospect of urban densification and meaningful corridor development materialising.

The resultant levels of public transport demand also inform the appropriateness of different public transport technology responses.

Generally, net densities of between 90-120 persons per hectare (or gross densities of 30-40 persons per hectare)[3] are felt, internationally, to provide a density level that provides a reasonable base of public transport ridership support.

Densities that are less than this level would require clearly stated public transport provision policy responses (e.g. service frequency per hour, hours of operation), that can change as densification levels change. Given the lower density levels that would apply to peri-urban and rural contexts as well, such a public transport policy response would also have merit.

For simplicity, four density ranges can be framed that relate to the "accessibility" requirements of particular urban locations:

- highly accessible localities adjacent to public transport interchanges should be between 80-100du/ha 200pph - 250pph (with an average household size of 2,5 persons / ha),
- Accessible localities adjacent to development corridors should be between 60-80 du/ha (150pph – 200pph),
- Within localities located 1 km walking distance from a corridor should be between 40-60 du/ha (100 – 150pph), and
- Within localities with densities <40 du /ha (<100pph), which require specified public transport policy responses (hourly frequencies, hours of operation) to support feeder services to nearby corridors and / or local or community services providing community access to community facilities (clinics, libraries, government facilities). Sight should not be lost of the fact that these services also provide access to domestic employees, who are often neglected in any consideration of public transport provision.

These guidelines are generally applicable to the final land use outcomes agreed for this study.

Figure 26, extracted from the DoT document, relates density, persons per ha and public transport technology responses as well as service frequency indications (person densities are based on an assumption of 3,5pph).

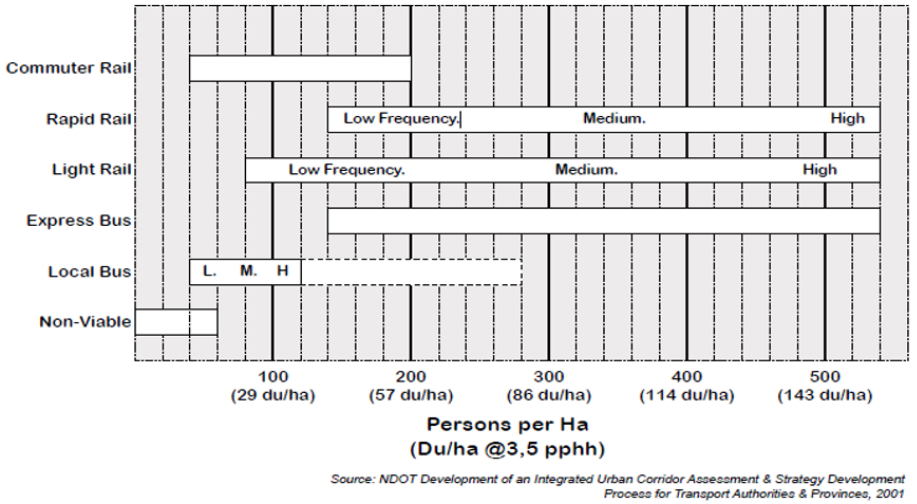


Figure 26: Density and Public Transport Responses

Figure 27 depicts a different representation of density, housing typologies and public transport policy responses.

[3] DOT, Integrated Urban Corridor Assessment and Strategy Development, 2001

It is important to note that this diagram highlights the importance of a policy response where urban densities are low, and that the rate of densification can be strongly supported by the availability of public transport, highlighting the need for early public transport policy responses to be adopted.

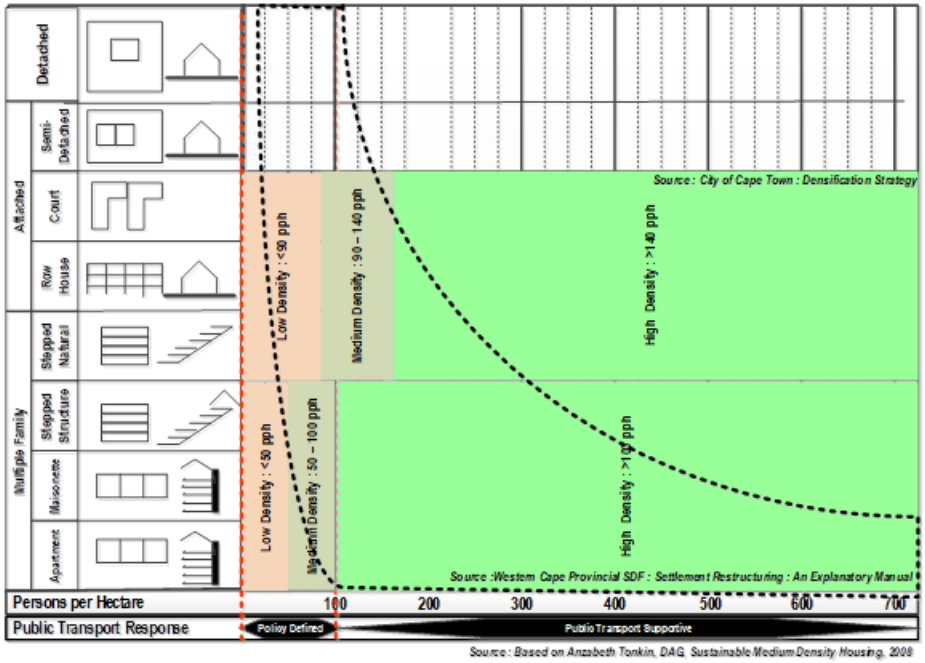


Figure 27: Density, Housing Typology & Public Transport Policy Response

While much of the discussion relates to the densities of residential areas, densification in employment areas is also of relevance, as is the provision of basic public transport services. If there is no public transport at both the journey start and end, then the public transport network cannot be attractive to a potential user. Encouraging mixed use development within corridors will further influence the public transport response.

5. Macro Level Modelling

The modelling philosophy that needs to be applied to the Bellville CBD requires it to be flexible enough to be able to migrate from a macro- level modelling response through a cordon area level to a simulation level and finally to a local area of modelling response.

This flexibility is considered important given the project intention to ultimately require a micro-simulation level of modelling response (which has not been undertaken in this phase of the project).

Microsimulation modelling allows for the realistic representation of on-street traffic conditions (private vehicles, buses and pedestrians) and the testing of future conditions, together with potential network improvements or mitigation, to assess the viability of the preferred nature and scale of any development.

In summary, the main aim of a microsimulation study will be to assess and evaluate further development of the combination of road proposal intentions and road based public transport responses with urban design proposals that will be undertaken in the next phase of the work. Specifically, a micro-simulation level of modelling will:

- Determine the performance of the existing infrastructure at a simulation scale and local scale;
- Determine the traffic impact of the trips generated by the development on the surrounding network;
- Evaluate the feasibility of mitigating measures seeking to address any identified shortfalls, including the impact of potential different public transport operations on the surrounding road network, additional stop-line or link capacity or traffic control measures as well as any changes to the pedestrian environment;
- Determine the effectiveness of various access options for the proposed development.

Figure 28 reflects the modelling framework that has been adopted.

The focus of this modelling phase of the project is at the macro or strategic level using the City of Cape Town EMME/4 model but the outputs are compatible to enable a more refined modelling response to be undertaken at a later stage.

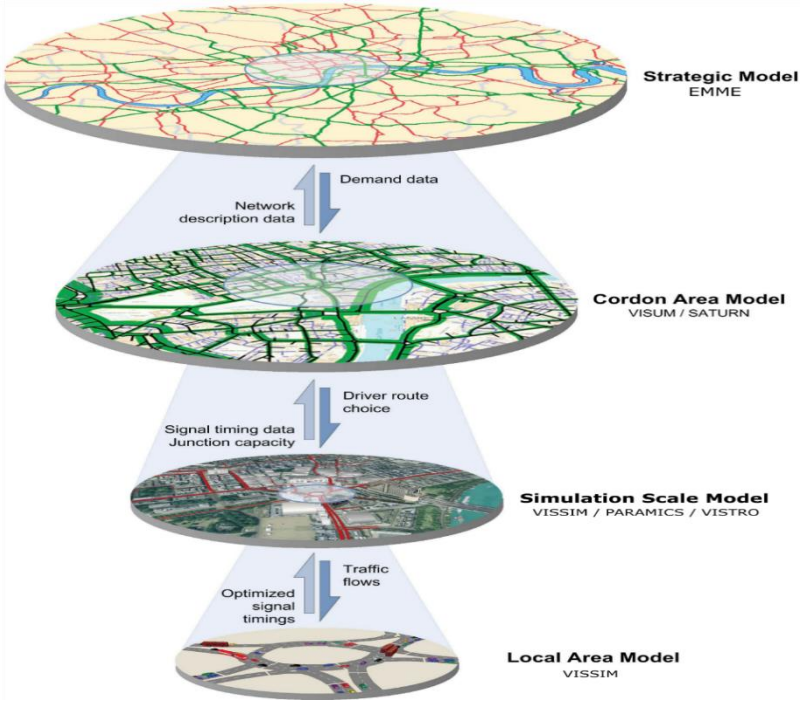


Figure 28: Modelling Context

5.1 Modelling Methodology

5.1.1 Modelling System

This project involves an EMME/4 transport modelling analysis of the Bellville Area, with a special focus on the future re-vitalisation of the CBD, and its role as an important metropolitan public transport hub. The results will be used to inform, and/or, confirm the long-term planning and design of the metropolitan road and public transport networks in the study area.

Various network improvements and combinations thereof, had to be analysed in conjunction with present and future land use scenarios for the metropolitan area, including local development proposals.

Cape Town's EMME/4 Metropolitan Transport Model has been in use since 1992 and has been updated regularly, i.e. to reflect changes in the transport network and land use patterns. The latest 2011 census information, and more recent 2013 metropolitan-wide household interview data, have also been incorporated into the model.

The model has been used for various applications and is generally used as a basic conventional four-step demand model, which is particularly useful for strategic level investigations.

The traffic assignment step has recently been upgraded with a variable demand methodology which more accurately reflects the road network's capacity constraints. It therefore automatically determines the peak hour traffic demand and the length of the peak period across the metropolitan network.

Another major improvement has been the introduction of a new modal split modelling routine which is more dynamic and responsive to the public transport network attributes.

In its present form, the metropolitan model focuses mainly on AM peak period commuter demand, covering the whole of the Cape Town Metropolitan Area, including Atlantis, Paarl/Wellington, Malmesbury, Franschhoek, Stellenbosch and the Helderberg area. It consists of 2 322 transport zones and more than 24 000 one-directional network links, representing all major metropolitan transport

infrastructure components. It also incorporates all metropolitan commuter rail services and existing MyCiTi trunk and feeder systems. Future network proposals have been defined in accordance with the Cape Town's long term Metropolitan Road Network and MyCiTi public transport proposals.

The EMME/4 model has been used for a number of important metropolitan studies in the Cape Town municipal area, including the City's Development Charges (DC) Policy, its Congestion Management Strategy, its Medium-Term Integrated Investment Framework (MTIIF) as well as a review model for the IPTN Business Plan. It has also been used recently for the Tyger Valley Area Transport Master Plan and the Paardevlei Macro Transport Impact Assessment.

5.1.2 The Four-step Modelling Approach

For reasons of transparency and simplicity, the Cape Town Metropolitan Model has been implemented as a fairly conventional four-step modelling approach for determining the AM commuter demand across the metropolitan area. These steps are as follows:

- **Trip Generation:** Household and employment data are used to determine the number of commuter origins and destinations in each transport zone. This information was updated/adjusted to comply with the latest land use information from the City of Cape Town and the most recent land use proposals for Bellville and the Tyger Valley Area;

- **Trip Distribution:** Household interview data provides the basis for determining the trip distribution patterns between zones of origin and destination. A 3-dimensional matrix balancing technique is then used to compute present and future (End State) travel demand for different income groups;

- **Modal Split:** A two-tier modal split procedure is followed. Firstly, to determine the split between motorised and non-motorised travel, and secondly, to determine the demand for public and private transport. Different modal split functions are used for different income groups, to allow for known variations in perceptions and preferences around modal choice. The travel time effects of traffic congestion are taken into account;

- **Assignment:** Private transport is converted into peak hour vehicular trips and assigned onto the (road) network using a variable demand equilibrium assignment procedure. Public transport passengers are assigned onto certain (allowable) elements of the road network, as well as rail services, using a multi-path routine in EMME/4.

It should be noted that the first three modelling steps involve income stratification, where demand calculations are performed for each income group separately.

5.1.2.1 Trip Generation

The trip generation model uses household and employment data to determine the home-work commuter demand, with trip productions as the origin totals at the home end and trip attractions as the destination totals at the employment end.

For each residential zone, the **trip productions** are calculated by multiplying the number of households (or residential units) in a particular zone by the average number of workers per household in that zone. These figures were obtained as follows:

- Household figures were extracted from the 2011 census data and updated by information from the 2016 Medium-term Infrastructure Investment Framework (MTIIF) study for Cape Town. More recent land use developments were also included in the model;

- Workers per household were obtained from the latest (2011) census data and adjusted by the most recent (2013) metropolitan-wide household interview surveys;

- Future household increments (2018 to 2040) were obtained from a modified version of the City's long-term Pragmatic Densification and Pragmatic Transit Oriented Development land use scenarios. This was updated with the most recent land use development proposals for the primary and secondary study areas.

Trip attractions refer to the number of work opportunities (employment) in each transport zone. Since there are no direct sources of reliable employment information, the following actions were used to establish some realistic estimates:

- Converting Municipal GLA records into employment figures;
- Extraction of employment estimates from traffic counts and cordon surveys;
- The analysis of household interviews, which indicated where people work, by income category;
- Existing land use development applications (m^2 GLA);
- Future employment increments (2018 to 2040+) were obtained from a modified version of the City's long-term Pragmatic Densification and Pragmatic Transit Oriented Development land use scenarios. This was updated with the most recent land use development proposals for the primary and secondary study areas.

Table 12 below provides a summary of the trip productions and attractions which are included for the metropole in the EMME model, and also for the primary area, the latter based on the assumptions described in Section 4 above.

The figures in Table 12 clearly illustrate Bellville's significant growth potential compared with the rest of the metropolitan area, particularly in terms of future residential accommodation.

Other key sites in the immediate vicinity of the Primary Area (Tygerberg Hospital, Transnet Site & Stikland Hospital) are also expected to contribute significantly to the growth potential of the region, adding about 16 000 additional households and 20 000 additional employment opportunities.

Table 12: Trip Generation Figures for the Bellville Primary Area (AM Peak Period)

	2018		Future		% Growth	
	Metropolitan	Primary Area	Metropolitan 2040+	Primary Area End State	Metropolitan	Primary Area
Households	1 279 760	6 601	1 837 610	28 807	44	436
Productions	1 373 362	8 922	1 990 565	40 130	45	450
Attractions	1 373 362	42 240	1 990 565	64 935	45	154

The household and employment increments are shown in Figure 29 and Figure 30 below.

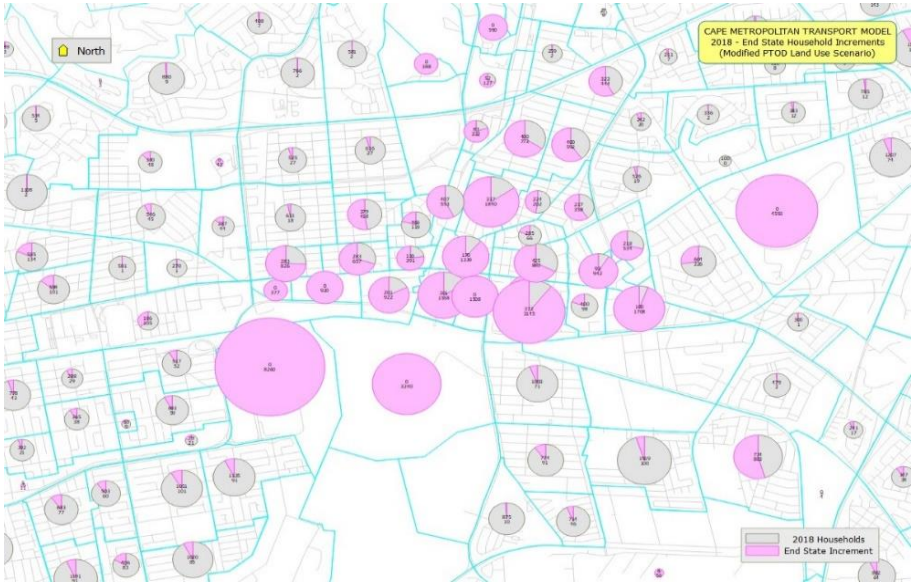


Figure 29: End State Household Increments

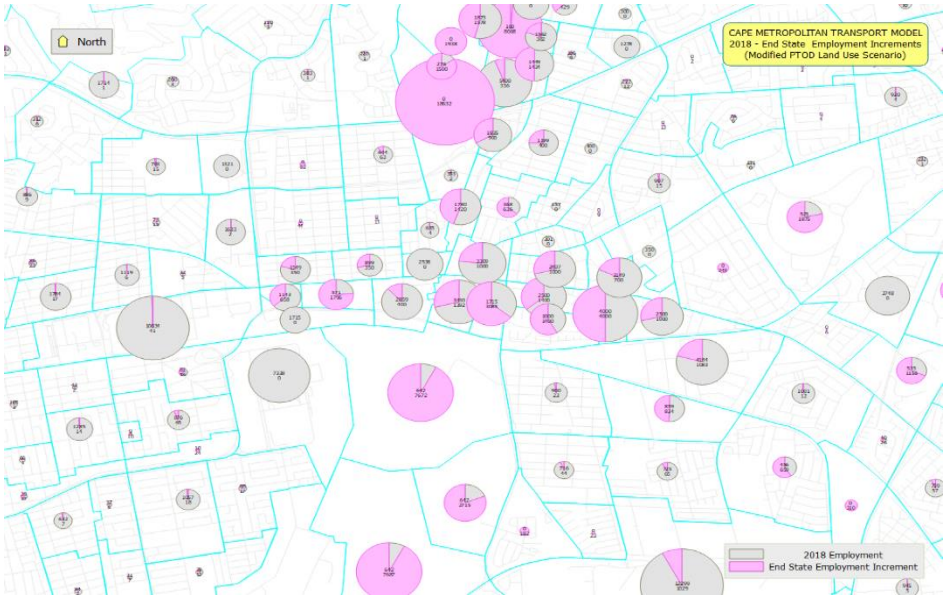


Figure 30: Employment Increments (PTOD End State Scenario)

5.1.2.2 Trip Distribution

Trip distribution is usually the second step in the conventional transport modelling process, and involves the number of trip interactions between given origins (productions) and destinations (attractions) in a study area, for a specific trip purpose. In the Cape Town model, a 3-dimensional matrix balancing technique is used to compute the distribution of commuter trips, using an observed or given profile of trip length frequencies as the third dimension constraint. This is done separately for different income groups.

The trip length frequencies used in the Cape Town EMME model are shown in Figure 31. Generally, the frequency patterns are very similar for the high and low income groups, except that the higher income group has a significantly larger proportion of short (0 – 2km) trip lengths. This is due to historic land use patterns, residential price structures and the increasing tendency for higher income people to work from home.

Presently, the average metropolitan trip lengths for higher and lower income commuters are 11.2 and 13.0 km respectively. With future metropolitan growth up to 2040, this is expected to increase to 11.8 and 14.0 km respectively. The average trip length for Bellville residents is significantly lower (8.5 km) than the metropolitan average, due to the abundance of work opportunities in and around the study area.

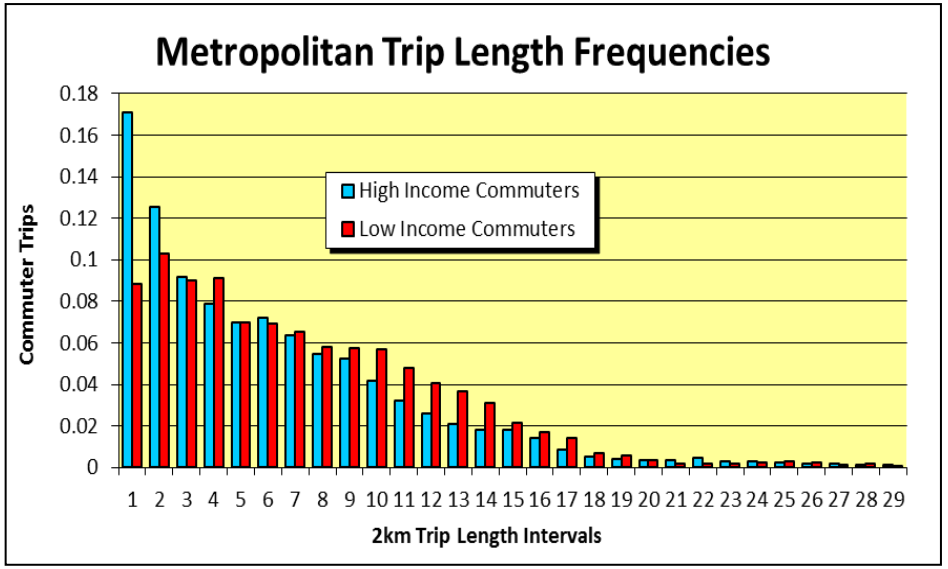


Figure 31: Cape Town Commuter Trip Length Distribution

The map in Figure 32 illustrates the current commuter trip origins to the employment opportunities in the primary and secondary study areas. It shows that the majority of trips originate either from the Bellville area, or from the residential clusters along the R300 orbital corridor. This metropolitan movement pattern between Mitchell's Plain/ Khayelitsha in the south and Kraaifontein/ Durbanville in the north is clearly visible, and is expected to develop into an

even stronger north-south travel demand corridor in the future. Due to the nature of the high density, mixed use development proposals, the model estimated that about 30% of Bellville's residents could be working locally in the study area.

Figure 32: Commuter Trip Origins for Bellville Study Area

5.1.2.3 Modal Split

Conventional transport models make use of modal split functions (or models) to determine the choice of mode(s) for a particular trip purpose between a given origin and destination pair. This is done separately for each income group in terms of the following sequential steps:

- A choice between motorised or NMT. This is dependent upon walking distance, topography, safe environment, NMT facilities, weather conditions, etc. The age of commuters and income also play a role. Generally higher income people tend to walk shorter distances than lower income commuters;

- A further choice for motorised travellers, between public and private transport. Trip lengths, travel time, travel cost, and quality of service are key determinants of modal choice, and the perceptions thereof vary significantly amongst different income groups. Typically, higher income groups value travel time and convenience much higher than travel cost, while the opposite is true for lower income commuters.

These choice processes have been replicated in the EMME model structure by means of a 2-level nested binomial logit model, with different calibration constants for different income groups. The resulting public and private transport matrices can then be assigned onto the relevant road and public transport networks.

The modal split results for commuter trips to and from the primary area, are shown in Table 13 below. These findings indicate a near fivefold increase in trip productions and a 54% increase in attractions. In both instances the model predicts large shifts from car usage to public transport, while non-motorised travel also remains high. Figures of this magnitude obviously have significant implications for the future transport situation in and around Bellville.

It should be noted that the model results are based upon assumptions around the provision of a vastly expanded and improved metropolitan, as well as primary and secondary area public transport systems. The attributes of the future system in the primary and secondary areas are described further below.

Table 13: 2018 and End State Modal Split Results for the Bellville Primary Study Area

	2018 Modal Split Results (AM Peak Period Commuters – person trips)						
	Car	**%**	**Pub Trans**	**%**	**NMT**	**%**	**TOTAL**
Productions	6 566	73.6	871	9.8	1 486	16.6	**8 922**
Attractions	23 774	56.3	16 481	39.0	1 985	4.7	**42 240**
	End State Modal Split Results (AM Peak Period Commuters – person trips)						
	Car	**%**	**Pub Trans**	**%**	**NMT**	**%**	**TOTAL**
Productions	12 768	31.8	22 338	55.7	5 023	12.5	**40 130**
Attractions	31 946	49.2	27 967	43.1	5 021	7.7	**64 935**

5.1.2.4 Trip Assignment

a. Private Transport

EMME/4 uses a variable demand equilibrium procedure to assign vehicular traffic onto the road network. This is done by using volume-delay functions to simulate the reduction in travel speed as a result of increased traffic congestion. This methodology more accurately reflects the road network's capacity constraints, by assigning traffic beyond a single peak hour. This process can be summarised as follows:

- A given land use scenario's peak period vehicular demand matrix is used as an input into the model. The assignment procedure then splits the peak period traffic into the assigned peak hour matrix plus a matrix of the residual traffic i.e. the traffic that cannot be accommodated on the network during the peak hour;
- After the traffic in the peak hour has been assigned, secondary assignments are performed until there are no more residual demand volumes. Each additional iteration produces a new peak hour, which adds to the peak period traffic on each link.

Important outputs of the variable demand assignment are:

- The relationship between the peak hour and peak period traffic demand for each zone pair across the metropolitan area;
- The peak hour as well as the total peak period traffic demand on each link in the network; and
- The average length of the peak period at all origins and destinations.

These indicators provide valuable comparative information about the intensity and duration of peak period congestion in different parts of the metropolitan area. The focus on the peak period conditions, rather than the peak hour alone, produces a far more rational, equitable and comprehensive approach to network analysis and planning.

The 2018 base-year vehicle assignment results for the peak hour and peak period are shown in **Appendix 3**. A comparison between the model assignment and the observed traffic confirms a generally good fit, particularly on the higher order roads leading into the study area. Most of the differences can be explained by:

- Traffic surveys that were conducted during 2018 when construction work on the N1 freeway was still in progress;
- Localised bottlenecks or network constraints that might have affected the traffic counts;
- Bellville's relatively open road grid, which complicates network representation;
- Some road-based public transport services that are inadequately represented in the model.

Table 14 provides a summarised comparison between the modelled and observed traffic at cordon counting positions around the perimeter of the Secondary Area. While the peak hour modelling results compare extremely well

with the traffic counts, the total peak period volumes are notably lower than the observations due to the large presence of industrial and business travel (work-work trips) during the latter part of the peak period. Business travel is under-represented in the modelling, which focusses primarily on commuters.

Table 14: 2018 Vehicle Trips into and out of Primary Study Area (including through traffic)

Direction	Peak Hour (vehicles)	
	Modelled	Observed
AM Inbound	17 693	16 960
AM Outbound	13 683	13 630

The model results were further verified by performing a link-based volume: capacity analysis. The results are shown in **Appendix 4**, and clearly illustrate capacity problems on the major roads feeding into the Bellville Area. This correlates well with real-time Google Traffic maps and provides further justification for the model's accuracy.

The results also confirm that most of the major roads in Bellville are moderately congested during the peak period, but this is relatively minor compared to some of the bottlenecks on, or beyond the periphery of the study area. The biggest capacity problems are along Strand Road west of the R300 Freeway, Mike Pienaar Boulevard and Durban Road south of the N1 Freeway, Symphony Way, Bill Bezuidenhout Avenue and Tienie Meyer.

b. Public Transport

An EMME/4 multi-path transit assignment routine is used to perform a third level of mode choice between individual public transport modes within an integrated network. This circumvents the problem of trying to deal with public transport modes individually or as separate entities, when in fact many commuters use a combination of modes to complete their journeys.

In the Cape Town model, an integrated public transport network represents all relevant public transport services (bus, rail, MyCiti, minibus-taxi, etc.) as well as feeder modes such as walk and park-and-ride.

It is important to note that this mode choice methodology, and its underlying philosophy, is based on a number of key assumptions, which include the following:

- Travel time and cost are important variables and require accurate network definition and public transport service information;
- Road-based public transport travel time must take peak period traffic congestion into account;
- Different income groups have different perceptions and choice preferences, which require different calibration constants;
- Different components of the public transport system are not necessarily viable alternatives for all income groups;
- The Cape Town model presently does not incorporate capacity constraints on the public transport system, assuming that the relevant authorities are committed to meet the demand;
- For modelling purposes, the MyCiti public transport routes run on virtual lanes - no congestion impact and no reduced road capacity for private vehicles.

The 2018 base year public transport assignment results are shown in **Appendix 5.** These peak period passenger volumes highlight the concentration of road-based services along the Robert Sobukwe and Durban Road corridors via the Bellville Transport Interchange.

A large number of passengers also arrive from Old Paarl Road and from the R300 via Voortrekker and Belrail Roads. The importance of the rail system is clearly evident, but it was not possible to confirm the accuracy of the rail assignment figures.

Generally it appears that the model's rail passenger numbers are approximately 1.5 times higher than the last official 2012 rail census counts.

Overall, the road-based public transport assignment figures correlate very well with the taxi and bus counts (converted to passengers) on the main transit routes. The only real discrepancy is along Durban Road, where the model results are about 60% higher than the count estimates. One possible reason for this discrepancy could be illegal taxi operations that bypass the Bellville Interchange and therefore Durban Road as well.

The model results also confirm that it is almost exclusively lower income commuters that use the public transport services to access employment opportunities in the Bellville primary area. Even the park-and-ride facility at Bellville Station has lost its former appeal.

5.1.3 Application of EMME/4

5.1.3.1 General

After the base year calibration/ verification exercise, the present road network was updated to include the recently completed N1 capacity improvements (additional lanes between Jip De Jager Drive and Old Oak interchanges). This modified network then formed the basis for a series of scenario tests with local and regional network improvements, which were identified as potential catalysts for the development of Bellville. These projects have been grouped into two main categories as follows (see Section 6 for detailed descriptions):

A. Those proposals that are located primarily within the primary study area ("the core area road proposals") to unlock its development potential. It is also anticipated that these projects will improve the road network operational performance within the Bellville CBD area to facilitate a more pedestrian and public transport friendly environment.
B. Those road proposals outside of the primary study area but within the secondary area ("the extended network road proposals") that contribute a positive redistribution of traffic using roads that pass through the Bellville CBD area while addressing a number of identified metropolitan level network issues or short-comings.

All road projects were first assessed in terms of the present (2018) demand, and thereafter in terms of the City's "End State" (2040+) Transit Oriented land use scenario for the long-term development of the metropolitan area.

In conjunction with these road network proposals, the EMME model was also used to assess the public transport implications for Bellville and its surrounds. Various IRT route proposals were tested, including a possible light rail connection to Cape Town International Airport.

5.1.3.2 Core Area Network Proposals

c. Robert Sobukwe N-S extension, including Carl Cronje linked with Durban Road.

This proposal forms part of Cape Town's long-term Metropolitan Transport Plan and involves the northern extension of Robert Sobukwe Road up to Durban Road at the Frans Conradie intersection. At the same time, Carl Cronje Drive is extended southwards to provide a continuous link with Durban Road south of Frans Conradie Drive.

Although the 2018 model results show a large potential shift of traffic from Durban Road to Robert Sobukwe Road, the volumes remain well within the capacity limits of this new Class 2 Road. One of the main advantages of this project is the elimination of the "dog-leg" traffic movements along Voortrekker Road, thereby improving the urban (and pedestrian) environment in the CBD.

The future End State results confirm a similar shift as before, but with significantly higher traffic volumes on Robert Sobukwe Road. Although approaching 80 - 90% capacity along some sections, a 4-lane road should cope with general traffic demand. In future, the positive impact on Voortrekker Road is expected to become much more prominent.

d. Frans Conradie Couplet Re-configuration.

This proposal has not been explicitly modelled but included in all the network scenarios as a 4-lane Class 2 arterial connection between Durban Road and Bill Bezuidenhout Avenue. The End State results show fairly high (AM) westbound traffic volumes, approaching the peak hour capacity of this arrangement.

e. Eastern extension of Maree Street to link with Old Paarl Road

This proposal involves the extension, re-alignment and upgrade of Maree Street as a dual carriageway between Durban Road and Old Paarl Road, thereby providing a parallel alternative to Voortrekker Road.

Both the 2018 and End State model runs show that the Maree Street Project is a logical network improvement in terms of the overall development objectives for the Bellville CBD re-vitalisation initiatives. Significant traffic reductions can be expected along Voortrekker Road, while Maree Street fulfils the function of diverting Old Paarl Road's traffic more directly towards the CBD destinations and parking areas.

A 4-lane dual carriageway cross section should provide sufficient capacity for the anticipated peak hour traffic demand.

f. Eastern extension of Tienie Meyer Road (two possible alignments)

- **Northern Alignment**

  This extension comprises the continuation of Tienie Meyer Road eastwards, from Robert Sobukwe Road along Suid Street / Belrail Road before linking with a partial interchange on Strand Road. Further extensions up to the Stikland site and ultimately with Old Paarl Road are possible, in the event that the Hospital property is re-developed at some point in the future.

  The 2018 model results show a significant shift of traffic from the present Belrail Road towards this new, more continuous east-west route. A smaller shift of CBD bypass traffic can also be expected, with traffic reductions along Voortrekker Road.

  The End State modelling scenario includes the Stikland development and the further extension of Tienie Meyer to Old Paarl Road. Traffic along this route is expected to increase significantly in response to this long-term scenario, reaching capacity between Robert Sobukwe Road and Voortrekker Road westwards during the AM peak hour.

  The results also show a potential redistribution of traffic from Old Paarl Road onto this new orbital corridor. The volume/ capacity figures indicate that it may not be possible to develop the Stikland site without this new route.

- **Southern alignment**

  This extension follows the original southern alignment across the northern railway line, into the Triangle Farm industrial area, and linking with Peter Barlow Street and Strand Road in the east.

  The 2018 as well as the End State modelling results show a large redistribution of traffic from existing east-west routes onto this important missing link in the network. Significant traffic reductions are highlighted along Voortrekker Road, Belrail Road and Kasselsvlei Road. The latter appears to be used as a peak period detour to avoid congestion along the Voortrekker corridor.

  The End State traffic volumes along Tienie Meyer (south) are significant, but still below the capacity of a 4-lane Class 2 arterial.

g. Church/ Reed Street extension to Willie Hofmeyer

This low order road proposal provides a connection between Church Street and Willie Hofmeyer Avenue via Reed Street. Upon completion, this creates a continuous link between Landros Road in the west and Willie Hofmeyer to the east, parallel to Voortrekker Road. The Church Street extension proposal also includes the reconfiguration of the Belrail/ Robert Sobukwe intersection to left-in-left-out (LILO) operations only.

It is generally difficult to model local road traffic accurately, due to multiple access arrangements and local circulation patterns. Nevertheless, in the case of the Church Street proposal, the results indicate that relatively modest traffic volumes can be expected, with some future potential capacity problems west of Robert Sobukwe in CBD area.

Church Street mainly attracts traffic from Belrail Road, as does Voortekker Road, due to the restrictions of the LILO intersection on the Belrail/ Robert Sobukwe intersection.

h. Southward extension of Willie Hofmeyer to Kasselsvlei Road

The Willie Hofmeyer road proposal comprises its extension southwards to Sackson Street and Kasselsvlei Road, making this a continuous high order route between Bellville South and Tyger Valley via Bill Bezuidenhout Avenue. A connection with Belrail Road is maintained in the form of a grade separated structure, which also crosses the northern railway line.

The 2018 modelling results show a significant travel demand along this route, with large traffic reductions on parallel north-south routes as well as some east-west routes, including Belrail, Maree and Voortrekker. Traffic increases can also be expected along Kasselsvlei and Industrie Street further south.

The End State demand pattern is similar to the 2018 results, except for the much higher traffic predictions, which confirm the need for this important missing link in the metropolitan network.

As a result of its wider influence, some additional capacity may have to be provided along Belrail Road east of Willie Hofmeyer.

i. Combined Core Network Proposals

After the individual assessments, the “Core Network Proposals” were combined to establish how they would contribute collectively to achieve Bellville’s development objectives. This was only done for the future End State land use scenario. A short extension of Landros Street was included to provide interim access to the northern part of the future Transnet development

The model results clearly illustrate the combined positive impact that these projects can have on traffic reduction within the CBD core area. Large traffic reductions are expected along Voortrekker Road and Durban Road – two important roads where urban renewal and pedestrianisation are being considered.

The results also identify and highlight some of the key missing links in the network. The introduction of the Robert Sobukwe Road (north-south) extension has a material impact on the north-south traffic movement, attracting significant vehicle volumes during the peak hour. Together with the Maree Street extension, these two proposals are major contributors to traffic reduction in and around the CBD area. Another important missing link is the southern extension of Willie Hofmeyer Avenue, which could play a major role in improving the overall efficiency of the road network east of the CBD.

In the absence of a final decision regarding the preferred alignment of the Tienie Meyer extension, it was decided to assess both options for the combined core network analysis. In each case, the results confirmed the need

for the extension of Tienie Meyer, with the objective to provide improved connectivity to the east.

5.1.4 Extended Network Proposals

a. C-D lanes along the N1 with a half diamond interchange

This proposal consists of a half diamond interchange between Carl Cronje Road and the N1 Freeway and includes parallel C-D lanes starting west of the Jip de Jager Interchange. Its main purpose is to facilitate future land use developments in the Tyger Valley area north of the N1 Freeway.

The 2018 and End State modelling results show that this project has the effect of relieving traffic along the N1 in both directions. It also realises a significant reduction in traffic in both directions along Frans Conradie Drive between Mike Pienaar Boulevard and the proposed re-aligned Carl Cronje intersection with Durban Road. The introduction of this proposal has a marginal positive effect on traffic distribution through the Bellville CBD.

b. Eastern extension of Robert Sobukwe Road to La Belle Street

The eastern extension of Robert Sobukwe Road, past Sack's Circle to La Belle Street, completes a critical orbital network link from the Tyger Valley area in the north to the Airport in the South, connecting major commercial and industrial areas.

The modelling results show immediate (2018) network benefits with a large shit of traffic from Peter Barlow to reduce trip lengths and avoid the congestion along Strand Road. Additional traffic is drawn from Robert Sobukwe Road (North-South) and the R300 Freeway.

The long-term End State results show similar patterns, but with increased traffic volumes. It is estimated that a 4-lane Class 2 arterial will be the minimum requirement to meet this demand. In addition, the volume/ capacity figures suggest that the existing La Belle Street will require capacity improvements between Strand Road and Bottelary Road.

c. Eastern extension of Francie van Zijl Drive to Kasselsvlei Road

This proposal provides a much-needed east-west linkage across the Transnet Site between the Tienie Meyer By-Pass and Robert Sobukwe Road (East-West link). The proposal, as currently envisaged, would traverse the current substantial operational areas associated with Transnet Freight Rail activities and the proposed 'back-of-Port" operations, to link with Kasselsvlei Road to the east of the Site.

The 2018 modelling results show that this new connection could attract a substantial amount of traffic from the Tienie Meyer By-pass, while also providing more direct accessibility to the Tygerberg Hospital site from the east. The End State predictions are even more pronounced, primarily due to the impact of future development proposals for the Transnet land. The regional importance of this east-west connector goes beyond its influence on the Tienie Meyer Bypass and the Bellville CBD, as evident from anticipated traffic reductions as far as Frans Conradie Drive and the N1 Freeway.

In terms of the End State scenario, the model shows that a 4-lane Class 2 cross-section will be sufficient to accommodate future traffic demand along this network proposal, including capacity upgrades along Kasselsvlei Road.

d. Southward extension of Landros Street

The Landros Road extension is a missing north-south link which could provide connectivity to the northern portion of the Transnet site south of the Bellville CBD. Further south it would intersect with the future Francie van Zijl Drive, giving access to the Tygerberg Hospital and other potential developments on

this site. A possibility exists to extend this road even further to link with Junction Street in Parow Industria.

The End State modelling results for the full scheme show significant traffic diversions towards Landros Road, from parallel north-south routes such as Francie van Zijl Drive, De La Rey Street and Robert Sobukwe Road. The traffic demand warrants a 4-lane cross-section, plus capacity improvements to the existing Landros Road.

A truncated version of this scheme, terminating at Francie van Zijl Drive, would however require similar road infrastructure investments, due to the potential concentration of future developments adjacent to Landros Road.

e. Combined Extended Network Proposals

After the completion of all the individual assessments, the "Extended" and "Core" network proposals were combined to establish how they would contribute collectively to achieve Bellville's development objectives. This was only done for the future End State land use scenario.

The outcome of the combined Core Area and Extended Network Road Proposal interventions is a material reduction in traffic associated with the Belville CBD and significant traffic relief along Frans Conradie Drive, Durban Road south of the N1, Voortrekker Road, Robert Subukwe Road south of the CBD as well as along Peter Barlow Road and the N1.

This reduction in traffic within the CBD core area supports the intentions to provide a movement environment within the core area that is pedestrian friendly and one that facilitates a better organisation of road based public transport service responses.

5.1.4.1 Public Transport Proposals

After the road network assessments, the modelling study focused on a range of public transport investigations to assist in determining the future form and function of the Bellville public transport hub. The future End State land use and extended network proposals were used as common background for all these scenario tests.

On the public transport side, the network included the full roll-out of the MyCiti BRT system, a vastly improved rail system, incorporating the future Blue Downs services, and the continuation of taxi services where warranted. Finally, the model was also used to test a LRT option parallel to Robert Sobukwe Road.

It was assumed that all future public transport services will comply with high levels of service, safety, security and comfort, similar to the best on offer by Cape Town's present MyCiti services. The modal split and transit assignment processes use the same fare and cost functions that currently applies for the different modes, and the network speed assumptions were as follows:

- Rail – travel speed coded according to present timetables;
- MyCiti – variable according to operating environment, but generally 30 km/hr along Class 2 arterials in urban areas. Travel time penalties apply for delays at bus stations;
- Minibus-taxi – Travel time equal to congested travel time on road network
- LRT – 35 km/hr with travel time penalties at station stops.

After numerous model runs and some network adjustments, the results show that Bellville's role as a principal metropolitan transit hub can be expected to intensify significantly, with major implications and opportunities.

The main findings (**without LRT**) can be summarised as follows:

- Very high passenger growth can be expected in terms of the future land use scenarios for Bellville and the Tyger Valley area north of the N1. The peak period north-bound (AM) demand could be as high as 24 000 (9 500 peak hour) along certain sections of the north-south BRT corridor. Capacity restraint measures will have to be introduced to encourage peak spreading and to lower the peak hour demand.

- The rail system's overall dominance is expected to continue, with increased passenger demand from the east, assisted by the introduction of the future Blue Downs railway line. Very high peak period passenger numbers are expected, with west-bound AM link volumes of up to 90 000.
- About 7 100 residents from the Bellville CBD area are expected to board the public transport system during the AM peak period (5 000 at the railway station and 2100 at the bus terminus). At the same time, about 10 800 workers arrive from elsewhere, alighting at the railway station (7 000) and bus terminus (3 800).
- The model estimates are that about 27 000 passengers could transfer between rail and road-based services during the AM peak period. A further 10 400 road-road transfers can be expected between the Durban Road and Robert Sobukwe Road services.
- The model predictions show that a large majority of public transport passengers are from lower income residential areas – an income profile that will become even more pronounced in the immediate future, until such time as service conditions are improved. This will have a direct impact on the commercial and other land use developments in and around the railway station and bus passenger facilities.
- The public transport demand pattern consists of two very prominent, but distinctly different movement axes: north-south, served by road-based services (MyCiTi) and east-west, by rail. Both transit corridors carry a high proportion of peak period through passengers – up to 60 000 at Bellville Station and 12 000 at the future BRT station. Presently there are no through passengers at the bus/ taxi terminus, due to forced interchanges).
- The model outputs confirmed that the future MyCiTi services were the preferred road-based travel choice, due to operating standards which outperformed minibus-taxis.
- The importance of the Robert Sobukwe Road northern extension was highlighted as a critical network element for the future road-based public transport system. Nevertheless, the development plans north of the N1 Freeway suggest that additional services will be necessary along the parallel Durban Road/ Carl Cronje route.

It should be noted that the findings of the modelling study are subject to a wide range of risk factors, some of which include the following:

- Basic model assumptions and input data;
- High population growth forecasts and land use patterns as contained in the City's long-term growth scenarios;
- Uncertainties about future government investments in formal public transport infrastructure and services;
- Potential changes to the City's integrated transport plans;
- Future macro-economic conditions and levels of employment.

5.1.4.2 Light Rail

Due to the very high public transport demand expected along the Robert Sobukwe north-south corridor, it became necessary to explore the introduction of a complementary light rail transit (LRT) system from the Tyger Valley area in the north to Cape Town International Airport in the south.

The benefits of such a proposal would be higher capacity, improved levels of service and reduced travel time due to exclusive right-of-way operations within dedicated light rail reserves.

After some preliminary investigations, a preferred option was tested with the following route description:

- Street operations within the Carl Cronje Drive road reserve, from Tyger Valley Centre to Durban Road south of Frans Conradie Drive;
- Underground tunnel along Durban Road from Frans Conradie Drive to Bellville Station;
- Underground station at Bellville with seamless transfer facilities between rail and light rail;
- Grade separated ground operations along the existing (disused) Racec rail reserve, from Bellville Station to Symphony Way, south of Stellenbosch Arterial;
- Major MyCiTi/ LRT passenger interchange at Symphony Way;

- The LRT continues inside the northern and eastern perimeters of the airport site and terminates at the CTIA terminal complex.

The EMME model results show that the proposed LRT system has the potential to dominate the north-south transport corridor, capturing most of the original MyCiTi passengers, and thereby rendering the BRT not viable as a parallel or complimentary mode.

The redistribution effect is however expected to go much wider, with the LRT attracting passengers from other parallel road-based services, including the R300. This is also evident in the Belhar and Delft residential areas where significant passenger numbers, which previously used the Sarepta railway line, shifted across to the new LRT system.

Due to the redistribution effects, the LRT is expected to carry much higher passenger volumes (up to 57% more) than the MyCiTi BRT proposal – 36 000 versus 23 000 AM peak period northbound south of Bellville Station.

This passenger increase can also be attributed to better connectivity and transfer opportunities with east-west routes such as the future Francie van Zijl Drive and Kasselsvlei Road.

Other findings of the LRT modelling investigation can be summarised as follows:

- With the introduction of the LRT, the east-west rail passenger volumes also increased, due to the proposed seamless transfer opportunities with the north-south LRT services at Bellville Station;
- The Airport connection carries significantly fewer passengers than the high transfer volumes from the south. It seems logical therefore that this demand profile could swing the case for southern continuity, and the extension of the LRT towards the Metro-South-East;
- It appears that the northern connection with the Tyger Valley area via Carl Cronje Drive, attracts a disproportionate number of passengers from the Robert Sobukwe Route, many of them switching back at the Frans Conradie interchange. This type of network inefficiency requires further attention and deliberate planning intervention to optimise the role and function of the two complementary routes.

This LRT study should be seen as an initial exploratory assessment of a potentially very large infrastructure item with huge costs and operating expenses. At the same time, the benefits for the metropolitan area could be significant and lasting, and the positive impact on Bellville's CBD beyond question.

Due to the wider impact of the LRT system, careful consideration will have to be giver to future transfer facilities and the re-assessment of the current MyCiTi network and its integration with the LRT. Unfortunately, this fell outside scope of the present study. More detailed studies are therefore necessary, with more specific design and operating criteria, under the auspices of a focused technical steering committee.

With additional information and the necessary program direction, the EMME modelling platform should be more than capable to assist with the relevant investigations.

6. Core Area Road Proposals

6.1 Overview

The core road proposals were identified from previous studies and following an extensive modelling and evaluation process that highlighted the merits of the individual schemes in relieving the vehicular traffic flows through the Bellville CBD core area.

In depth consideration of the outcomes resulted in a “core group of road proposals” that collectively had a significant positive impact on traffic reduction within and through the Bellville CBD. Conclusions relating to the individual road proposals are outlined. Figure 33 illustrates the proposals.

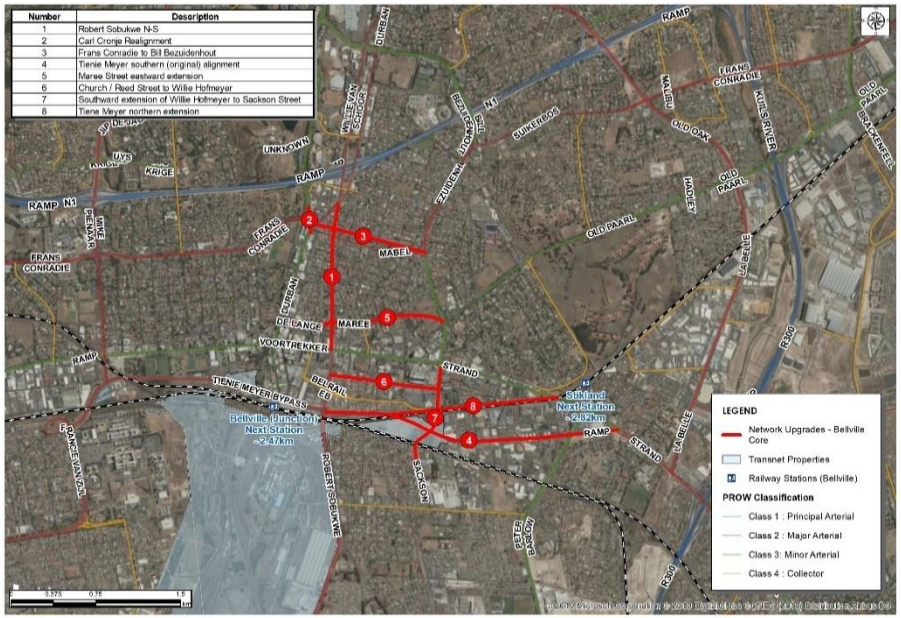


Figure 33: Overview of Core Area Road Proposals

6.2 Road Proposals

The road proposals are listed below in Table 15.

Table 15: Core Area Road Proposals

Number	Core Area Road Proposal Description
1	Robert Sobukwe Extension (north-south)
2	Carl Cronje realignment with Durban Road
3	Frans Conradie Drive couplet reconfiguration through to Bill Bezuidenhout Avenue
4	Maree Street upgrading and extension
5	Tienie Meyer Extension:
5a	Northern alignment + the eastern portion of the southern alignment
5b	Southern (Original) alignment
6	AJ West / Church Street / Reed Street upgrading / extension
7	Willie Hofmeyer north – south extension linking Bill Bezuidenhout to Sackson Street

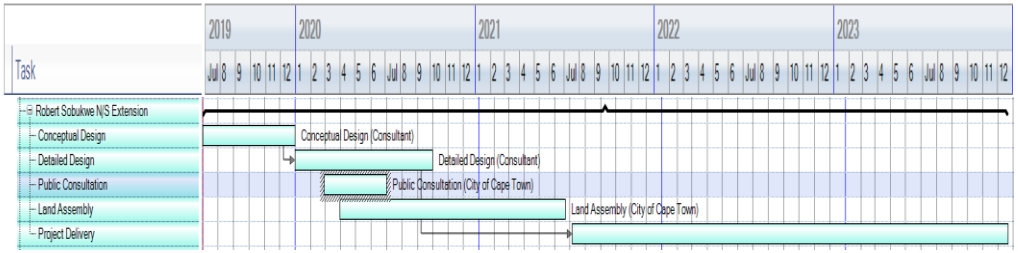
6.3 Summary of the Core Area Road Proposals

The introduction of this set of road proposals has a positive impact on traffic reduction within the CBD core area. Specifically, traffic along Durban Road, Voortrekker Road, Church Street, Belrail Road and Robert Sobukwe south of the railway lines is reduced. The introduction of Robert Sobukwe Road (north-south) extension has a material impact on the north-south traffic movement attracting significant vehicle volumes during the peak hour. Together with the Maree Street extension, these two proposals are a major contributor to traffic reduction on Durban Road and Voortrekker Road as well as the minor north-south links to the east. The introduction of the Willie Meyer north-south link from Bill Bezuidenhout / Maree Street to Sackson Street and beyond to Kasselsvlei Road and then on to Robert Sobukwe Road (East-West) has a significant impact on traffic distribution to the east of the CBD core area.

ROAD PROPOSAL DESCRIPTION: **ROBERT SOBUKWE EXTENSION FROM VOORTREKKER ROAD TO DURBAN ROAD (N-S EXTENSION)**

Project Description	Considerations	Priority
This proposal provides a dual carriageway facility link between the existing Durban Road north of Frans Conradie and Modderdam Road south of Voortrekker Road. It provides a key linkage in the Bellville CBD road network, one that provides operational relief to Durban Road, Voortrekker Road, Barnard Street and Bill Bezuidenhout Avenue. It fulfils a multi-functional role, accommodating a strong private vehicle demand, as well as a providing a more direct freight route to the N1 from the industrial areas to the south (Transnet site and Sacks Circle) for freight traffic which currently utilises the Tienie Meyer Bypass and Mike Pienaar Boulevard to access the N1. The MyCiti Trunk Route 13 is planned for this proposed extension, providing a more direct link to the north. Operational relief along Durban Road provides opportunities for both accommodation of enhanced community / feeder public transport services as well as providing mobility support for increased development along Durban Road. The road reserve requirements in the vicinity of proposed BRT Stations that could be located immediately north of Voortrekker Road as well as in the vicinity of Frans Conradie Drive would require review in terms of the potential impact on the road reserve currently in the process of being acquired.	• Some important considerations are: • Constrained Road Reserve (32m), modified cross-section options • Potential additional road reserve requirements associated with proposed BRT Stations at Voortrekker Road / Frans Conradie to accommodate passing lanes • Accelerated land assembly programme • Transitional use as a street transit route	High: X Medium: Low:

Delivery Timeline

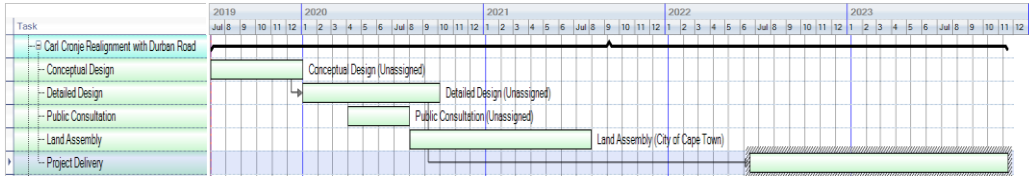


Road Proposal Alignment

ROAD PROPOSAL DESCRIPTION: **CARL CRONJE DRIVE REALIGNMENT**

Project Description	Considerations	Priority
This road proposal forms an integral part of the Robert Sobukwe (North / South) extension proposal, aligning with Durban Road to the south of the N1 through the Frans Conradie Drive intersection. It provides a secondary direct north-south network link between the Bellville CBD and areas adjacent to Carl Cronje Drive to the north of the N1.	• Cross-section review to support activity role • Accommodation of potential light rail alignment • Finalisation of land assmbly • Transfer station with BRT/Street transit in Robert Sobukwe	High X Medium Low

Delivery Timeline

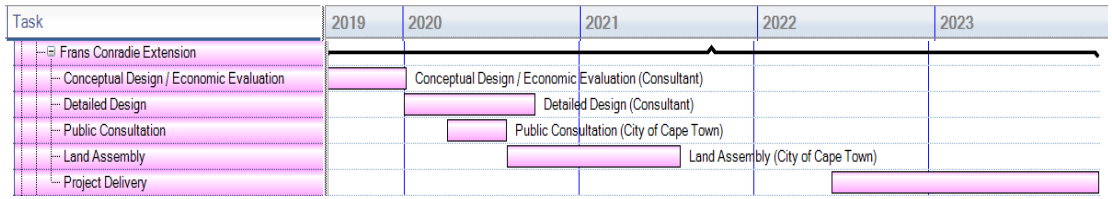


Road Proposal Alignment

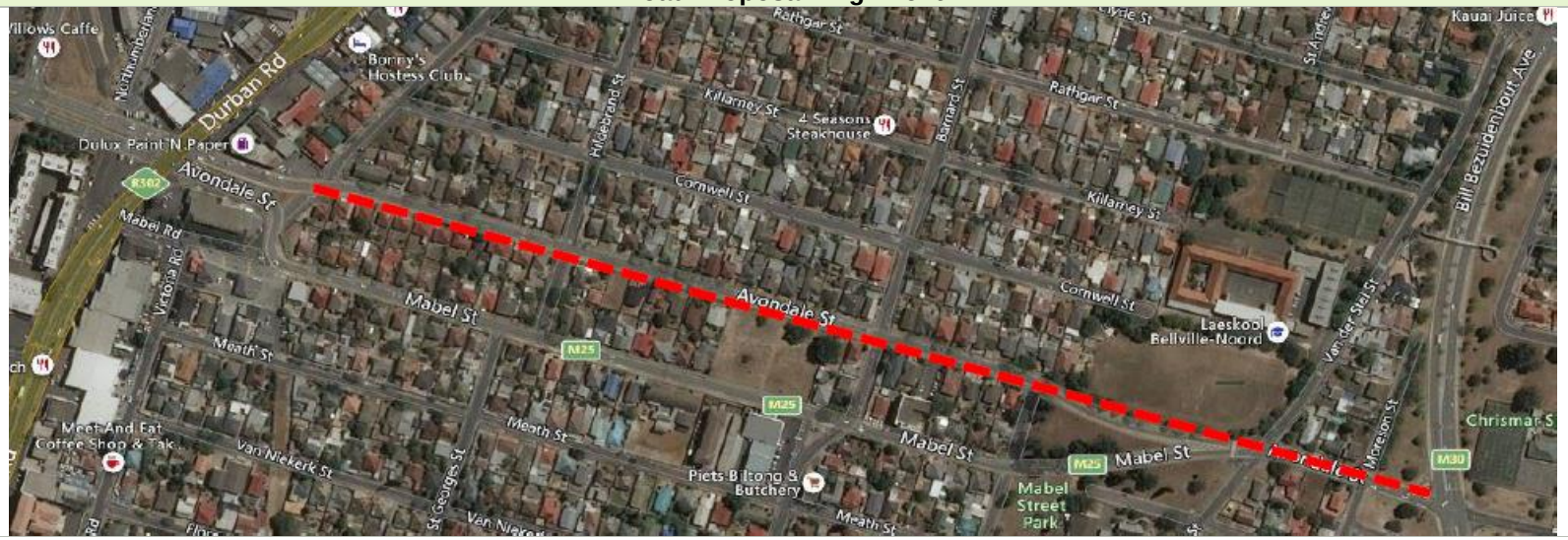
ROAD PROPOSAL DESCRIPTION: **FRANS CONRADIE EXTENSION**

Project Description	Considerations	Priority
The consolidation of the current couplet arrangement will improve the linkage from the Durban Road / Robert Sobukwe Road node immediately to the south of the N1 through to Bill Bezuidenhout Drive. This will strengthen this east-west linkage.	• Integrated design with Robert Sobukwe / Carl Cronje • Land Assembly • Implementation timing	High X Medium Low

Delivery Timeline



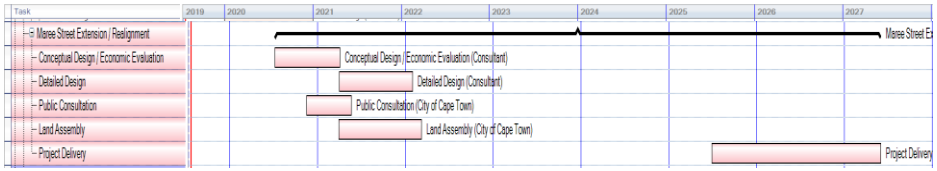
Road Proposal Alignment



ROAD PROPOSAL DESCRIPTION: **MAREE STREET**

Project Description	Considerations	Priority
This road proposal provides an alternative route to Voortrekker Road for circumventing the CBD which has been compromised, from a private vehicle mobility perspective, by the pedestrianisation interventions that have occurred historically. The introduction of an upgraded Maree Street facility will allow Voortrekker Road to become a more focused pedestrian and public transport focused facility. The proposed realignment and upgrading of Maree Street extends from Durban Road in the west to Bill Bezuidenhout Avenue and Old Paarl Road to the east. The proposed new alignment of Maree Street will enable the extension of a duelled carriageway to Old Paarl Road from Brackenfell through to Durban Road. The extension of Maree Street further to the west beyond Durban Road does not appear to be warranted. The Maree Street proposal requires significant intervention given that its function will materially change and that the current road reserve is not sufficient to accommodate the envisaged improvements and re-alignment, requiring a substantial acquisition of properties along its length. The 1998 Preliminary Design Report proposals advocates a WCG Class E(ii) Municipal Cross-section with 2,0m (preferably 2,4m) sidewalks along its length. Given the changed focus towards pedestrian movement supported by a more comprehensive public transport service provision, this arrangement would warrant review.	• Land assembly implications • Cross-section confirmation • Long-term parking accommodation	High: X Medium: Low:

Delivery Timeline



Road Proposal Alignment

ROAD PROPOSAL DESCRIPTION: **TIENIE MEYER BY-PASS EXTENSION (EAST)**

Project Description

The review of this proposal has indicated two alignments that would require further consideration.

- The **original southern alignment**, for which a ROW exists (although compromised in two locations along its length), moves eastwards from Robert Sobukwe before aligning southwards across the eastern railway line and approaches to Bellville Station, to link with Peter Barlow Street and, shortly thereafter, with Strand Road. This alignment provides limited relief for a portion of Strand Road between Belrail Road and the new connection to the Tienie Meyer By-pass.
- The **northern alignment** continues eastwards from Robert Sobukwe Road along Suid Street / Belrail Road before linking with Strand Road to the east. This proposal allows consideration of an extended connection beyond Strand Road to link with the Stikland site and ultimately with Old Paarl Road.

The proposal will require a review of the land take requirements (expropriations) as well as a consideration of a connection with any southern extension of Willie Hofmeyer Avenue to join Sackson Street south of the railway lines in addition to an evaluation of at-grade and grade separated interfaces with Strand Road. The role that Willie Hofmeyer Avenue plays in supporting both of these alignments cannot be under-estimated. While both proposals have differing merits, a final outcome and recommendation would only be possible following a more detailed feasibility and economic analysis.

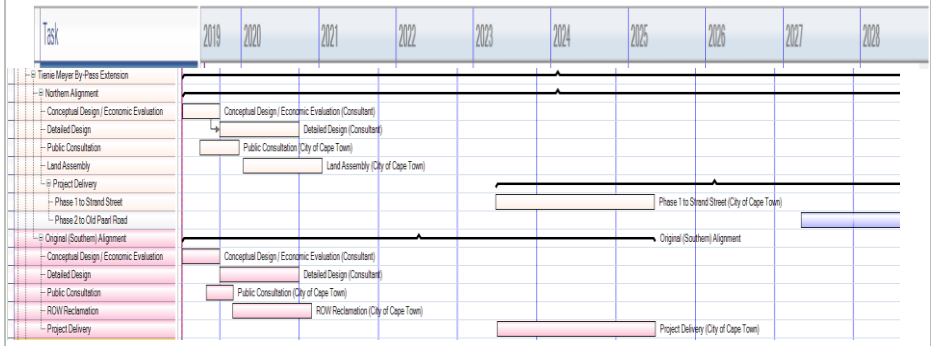
Considerations

- Land assembly along northern alignment
- Interchange implications with Strand Road
- Intersection / interchange implications with Willie Hofmeyer
- Bridge construction implications

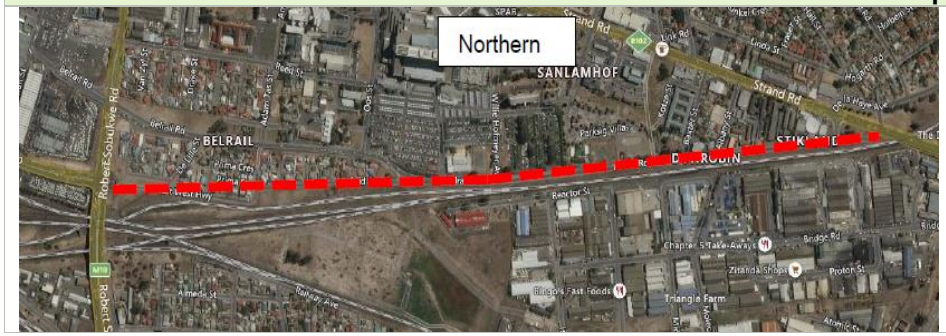
Priority

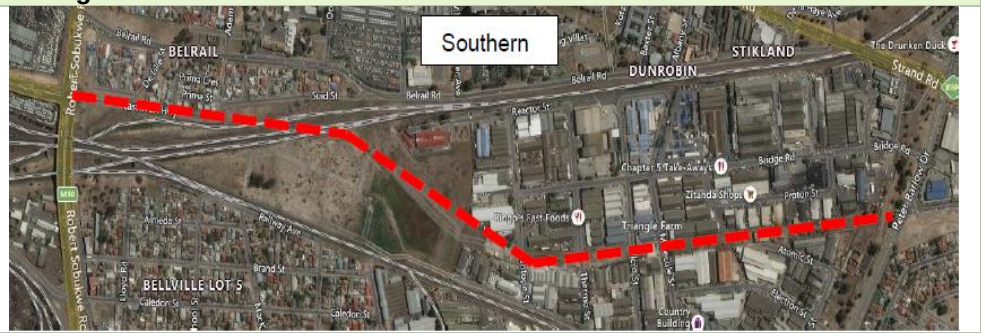
High	X
Medium	
Low	

Delivery Timeline



Road Proposal Alignment

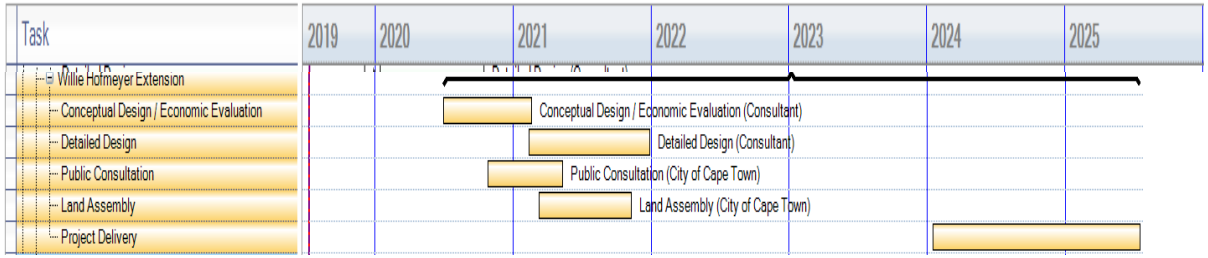




ROAD PROPOSAL DESCRIPTION: **WILLIE HOFMEYER AVENUE EXTENSION**

Project Description	Considerations	Priority
A review of the broader primary and secondary study area road network configuration and spacing, highlighted gaps in the road network configuration and provision around the Bellville CBD. One such gap was a north-south link extending Bill Bezuidenhout Avenue southwards along Willie Hofmeyer to cross Belrail Road / Tienie Meyer By-Pass extension to link with Sackson Street south of the Transnet / PRASA railway lines. Although not tested for technical feasibility, the modelling outcomes reflect an underlying need for such a link, the value of which is strongly reinforced when considered as part of the combined core area road proposals for the envisaged end state land use.	• Technical and economic feasibility of both proposals • Land assembly implications (northern alignment) • Grade separated crossing requirements (both) • Integration with Willie Hofmeyer extension	High: X Medium: Low:

Delivery Timeline



Road Proposal Alignment

ROAD PROPOSAL DESCRIPTION: **AJ WEST / CHURCH / REED STREETS**

Project Description	Considerations	Priority
In the absence of the Tienie Meyer By-Pass extension and Willie Hofmeyer Avenue proposals for the Core Area, this link plays a relatively significant role in providing "internal access" to development between Voortrekker Road and the existing Tienie Meyer By-pass for the areas extending from Landros Road to the west to Willie Hofmeyer to the east. Within the context of the Core Area Road proposals, the significance of this link varies depending on the combination of core area road proposals applied. • In terms of supporting development between Landros Street in the west to Robert Sobukwe Road in the east, the AJ West / Church Street Link retains a relevance for internal access and modest traffic distribution once the development of the Paint City and the current PTI sites are developed; • With the <u>northern alignment</u> of the Tienie Meyer By-Pass Extension, Belrail Road diminishes in role and function, while Reed Street (extended through the Sanlam site to connect to Willie Hofmeyer Avenue) assumes an important access role for development potential between Robert Sobukwe Road to the west and Willie Hofmeyer Avenue to the east. • With the <u>southern (original) alignment</u> of Tienie Meyer By-Pass extension, Belrail Road assumes a significant connectivity role between Robert Sobukwe Road to the west and the Stikland site and Old Paarl Road to the east. The role of Reed Street is significantly diminished through the Sanlam site with this scenario, potentially obviating the need for such a link, while providing a level of local access to the western development parcels that links to a left-in / left-out arrangement on Robert Sobukwe Road.	• Completion of precinct planning (urban design) • Parking & loading responses	High Medium X Low
	Delivery Timeline	
	Unknown	

Road Proposal Alignment

7. Extended Network Road Proposals

7.1 Overview

Various road links have been identified as important links for the future that are located within the secondary study area. These links are regarded as important extended network links that are supportive of the development of the Bellville core area in that, collectively, they bring about a redistribution of traffic away from the CBD area by increasing the opportunities for by-passing the CBD.

These links are reflected in Figure 34. They have been modelled individually to assess the high-level implications of the road proposal introduction into the broader network and to assess potential influences on the Bellville CBD core.

In most cases, their impact on the CBD core is marginal or negligible yet they do fulfil a broader role in the wider road network that needs to be taken into account particularly where they interface with key core road proposals such a Tienie Meyer By-pass extension and the Robert Sobukwe (east – west) extension to La Belle Road.

They have also been modelled collectively with embedded core area road proposals.

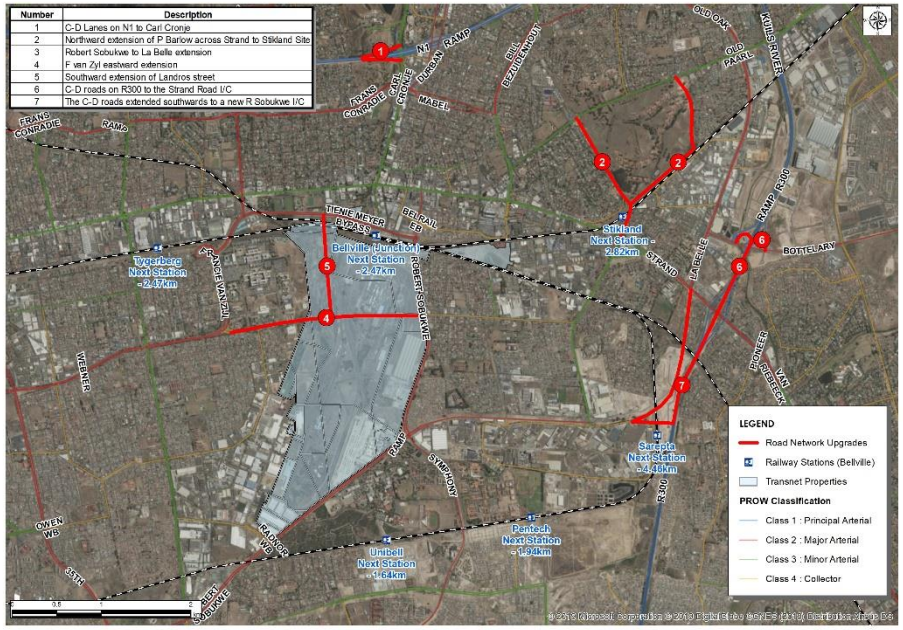


Figure 34: Overview of Extended Network Area Road Proposals

7.2 Extended Network Road Proposals

The road proposals are listed below and summarised in Table 16. Some additional Extended network level road proposals that could warrant further investigation by the City of Cape Town, that are noted but not tested, are shown as A and B in the table.

Table 16: Extended Network Road Proposals

Number	Extended Network Road Proposal Description
1	Robert Sobukwe Extension (East / West) linking with La Belle Road
2	Francie van Zijl Drive Extension to Kasselsvlei Road
3	C-D Lanes on the N1 to Carl Cronje Drive
4	Northward Extension of Pieter Barlow Across Strand Street to link with De La Rey Ave to the east of the Stikland Site, extending along a new road on the south-eastern Stikland site boundary to Cilmor Street before linking with Old Paarl Road along with an upgraded Kopies Road on the eastern edge of the Stikland site
5	The extension of Landros Road from Voortrekker Road in the north to Francie van Zijl Avenue in the south
Additional Extended Network Road Proposals for consideration	
A	The linking of Robert Sobukwe extension (east/ west) directly with the R300
B	The inclusion of CD roads between the possible Robert Sobukwe interchange on the R300 and that Bottelary half-diamond interchange.

7.3 Summary of the combined Core Area and Extended Network Road Proposals

The outcome of the combined Core Area and Extended Network Road Proposal interventions is a material reduction in traffic associated with the Belville CBD and significant traffic relief along Frans Conradie Drive, Durban Road south of the N1, Voortrekker Road, Robert Sobukwe south of the CBD as well as along Pieter Barlow Road and the N1.

This reduction in traffic within the CBD core area supports the intentions to provide a movement environment within the core area that is pedestrian friendly and one that facilitates a better organisation of road based public transport service responses.

7.4 Rail Crossing Capacity

A key consideration in assessing the necessity for the additional crossings of the railway line passing through the Bellville core area, is the capacity available relative to the peak hour vehicle demand. Figure 35 indicates the end state AM peak hour vehicle volumes associated with each of the crossing points. Each crossing point reflects a demand level that warrants the provision of the crossing.

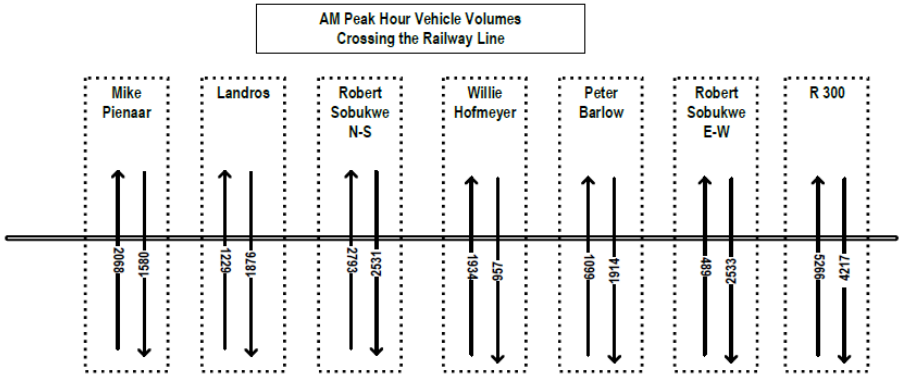


Figure 35: Railway Line Crossing Volumes

ROAD PROPOSAL DESCRIPTION: **CARL CRONJE HALF DIAMOND INTERCHANGE**

Project Description	Considerations	Priority
This proposed half-diamond interchange received conditional approval in 2000 based on the provision of on and off ramps via collector-distributor (C-D) roads which can be linked to full C-D roads between and through the major interchanges on the N1. The introduction of this half diamond interchange has the effect of relieving traffic along the N1 in both directions. It also realises a significant reduction in traffic in both directions along Frans Conradie Drive between Mike Pienaar Boulevard and the re-aligned Carl Cronje intersection with Durban Road. However, the introduction of this proposal has a marginal positive effect on traffic distribution through the Bellville CBD. A basic requirement for such a facility is that it should not introduce unsafe geometric standards and concomitant adverse traffic flow conditions.	• Requires agreement with SANRAL, Province and the City	High: Medium: Low: X
Delivery Timeline		
Unknown		

Road Proposal Alignment

ROAD PROPOSAL DESCRIPTION: **FRANCIE VAN ZIJL DRIVE EXTENSION**

Project Description	Considerations	Priority
This road proposal provides a much needed east-west linkage across the Transnet Site between Tienie Meyer By-Pass and Robert Sobukwe (East-West link). The proposal, as currently envisaged, would traverse the current operational areas associated with Transnet Freight Rail (TFR) activities and the proposed 'back-of-Port" operations, to link with Kasselsvlei Road to the east of the Site. The proposal lends itself to providing east west linkage opportunities that relieve the Bellville CBD of unnecessary through traffic. In the event that Transnet favourably considers suggestions from the City of Cape Town for a consideration of on-site optimisation that locates the TFR freight and back-of-port operations to the south to the proposed road linkage while promoting development of it that is more attuned to mixed use development to the south of Bellville Station (and to the north of the Francie van Zijl extension). The proposal will have a dual function of accommodating east-west through traffic while providing access to any proposed development situated immediately to the north of it on the current Transnet Site. The macro-modelling outcome highlights the important role that such a link would play in reducing traffic through the CBD area, the final informant and determinant will be Transnet's Master Planning for the site and the strategic decisions that are taken regarding its core and non-core.	• Finalisation of Transnet Site Master Plan • Technical and economic feasibility	High Medium Low X

Delivery Timeline

Dependent upon finalisation of Transnet Master Plan for the Bellville Transnet Site

Road Proposal Alignment

ROAD PROPOSAL DESCRIPTION: **LANDROS ROAD EXTENSION**

Project Description	Considerations	Priority
The review of the road system configuration and spacing highlighted two "gaps" related to north-south linkages in the road network through the primary study area. Landros Road extension is the second missing north-south link identified if it is accepted by all affected parties that the mixed use redevelopment of the northern portion of the Transnet site between the railway lines to the north and the proposed Fransie van Zijl Drive extension to the south is a viable land use response. This extension would also be supportive of any envisaged re-development (still to be confirmed) of the Tygerberg Hospital site as a mixed use development. The envisaged link would need to traverse both the existing rail lines (in addition to any envisaged expansion of the passenger rail lines from Bellville Station to Cape Town) and any additional rail lines to support "back-of-port" operations. It would also need to negotiate an environmentally sensitive area within an identified "green lung". There are two options that are considered: • An extended Landros Road to link with Robert Sobukwe Road in the south; • A truncated extension that links with the existing Fransie van Zijl Drive.	• Finalisation of Transnet Site Master Plan • Agreements with Transnet • Northern Precinct Master Plan (including Southern Station Forecourt Precinct Plan	High Medium X Low

Delivery Timeline

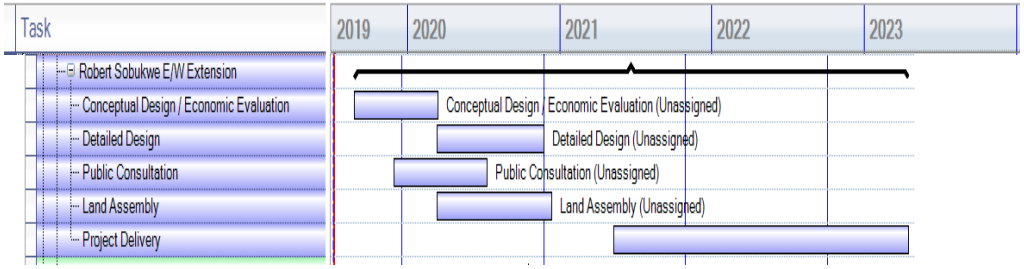
Unknown – Dependent on Transnet Master Plan

Road Proposal Alignment

ROAD PROPOSAL DESCRIPTION: **ROBERT SOBUKWE ROAD (EAST-WEST) EXTENSION TO LA BELLE ROAD**

Project Description	Considerations	Priority
The extension of Robert Sobukwe Road Extension to La Belle Road completes a critical east-west network link drawing traffic from both Robert Sobukwe Road (North-South) as well as from Pieter Barlow Road. The implications for freight traffic re-routing cannot be underestimated noting the high level of freight movement that currently makes use of Robert Sobukwe – Tienie Meyer By-Pass and Mike Pienaar Boulevard to access the N1. The proposed alignment necessitates the crossing of the Bellville – Strand line (including provision for a possible quadrupling of lines to accommodate future rail planning). In addition, it would be required to also cross the loop link between the Strand and the Serepta railway lines. This would entail a significant road-over-rail bridge requirement unless PRASA could concede the necessity for retention of the loop line in which case the bridge requirement would be materially reduced. The conceptual design for this proposal would clarify the outstanding issues that require resolution to enable this proposal to be advanced.	• Resolution of the rail link reverse loop retention with PRASA • Land assembly north of railway line	High: Medium: X Low:

Delivery Timeline

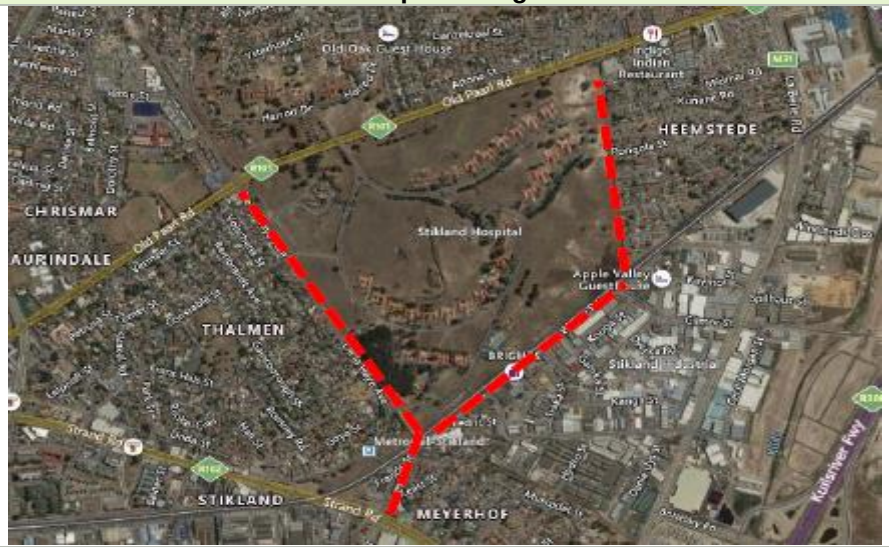


Road Proposal Alignment

ROAD PROPOSAL DESCRIPTION: **STIKLAND HOSPITAL SITE SUPPORTING ROAD PROPOSALS**

Project Description	Considerations	Priority
The extension of either (i) the Tienie Meyer By-Pass by way of the northern alignment, or the extension of the Belrail Road in the event of a southern alignment for the Tienie Meyer By-Pass extension road, would need to consider a new facility from Strand Road to an intersection with Cilmore Road before continuing to link, on the eastern edge of the site, to Old Paarl Road to the north. De le Hay Avenue would require upgrading between this new link and Old Paarl Road. These road elements attract a moderate level of traffic making this connection(s) worthy of further consideration to establish the technical implications of the Cilmore linkage once clarity is obtained regarding the final intentions for the Stikland site.	• Preferred Tienie Meyer Extension alignment • Development intentions on Stikland site	High: Medium: Low: X
	Delivery Timeline	
	Unknown	

Road Proposal Alignment



8. Public Transport

8.1 Introduction

The current public transport status quo is unacceptable, with poor interchange connectivity, little or no operational integration and without proper or effective interchange management resulting in very poor perceptions of, and satisfaction levels associated with, the quality of services being provided and the environment within which transfers and interchange occur.

The availability of a well-located and functioning public transport system providing safe, reliable, and affordable services is fundamental to the effective rejuvenation of the Bellville CBD core.

The services provided should be spatially (locational) and operationally (ticketing, fares, timetables and passenger information) integrated resulting in seamless interchange that enhances the passenger's travelling experience.

There are two key delivery mechanisms: (i) a modernised passenger rail system and (ii) a transformed and optimised road based public transport system.

8.2 Public Transport Technology Choice Framework

Public transport technology responses will need to be given careful consideration. This requires an understanding of the functional capability of the various public transport modes that are possible. Table 17 reflects the attributes associated with public transport modes having relevance in the Bellville context.

Table 17: Public Transport Technology Choice Framework

Mode	Implementation Timeframe	Capacity (pphd)	Max Gradient	System Life (Years)	Unit Carrying Capacity	Infra Cost $m/km	Per Pax Operation Cost $/km	Travel Speed km/h	Optimal route length	Optimal Stn Spacing
Bus	Short	2500-6000	13%	8-14	40-120	0.2-2.6	0.23	10-18	15	0.3-1.0
BRT	Short/Medium	4000-10000	13%	8-14	40-120	5.7-22.5	0.23	15-23	15	0.4-1.0
Skytrain	Medium/Long	6000-10000	>10%	n/a	60-120	10	n/a	17-30	3-10	0.3-1.0
Tram	Medium/Long	5000-10000	10%	25-50	400-600	6.7-21.5	0.26	15-23	15	0.4-1.0
LRT	Medium/Long	10000-25000	10%	25-50	400-600	6.7-21.5	0.26	17-30	15	0.4-1.0
MRT/ Metro Rail	Long	20000-35000	3%	25-50	2000-3000	8-30	0.19	25-40	30	0.5-3.0

8.3 Passenger Rail Service Provision

A fully functional and modernised passenger rail sector plays a critical role in supporting the urban and economic renewal and development of the second metropolitan economic hub.

8.3.1 Rail Achievements to date

Since the decision was taken by Cabinet to support the renewal of passenger rail in South Africa, a number of achievements within the Western Cape can be noted:

8.3.1.1 Re-signalling of the Western Cape System

The upgrading of the signalling system in the Western Cape was initiated during 2012 and progressed from tender award in May 2013 through a significant specification review and design process before commencing implementation. To date the following milestones have been achieved:

- Re-signalling of the Southern Suburbs and Cape Flats lines (completed);
- The construction of the new control centre in Bellville has been completed, with commissioning in process that will allow PRASA to relocate, towards the end of 2019, the operational "nerve centre" from its current location at Windemere, and
- The commencement of the re-signalling of the northern lines, including the re-configuration of Bellville Station that is currently in progress.

8.3.1.2 Securitisation of the Metro South East Corridor

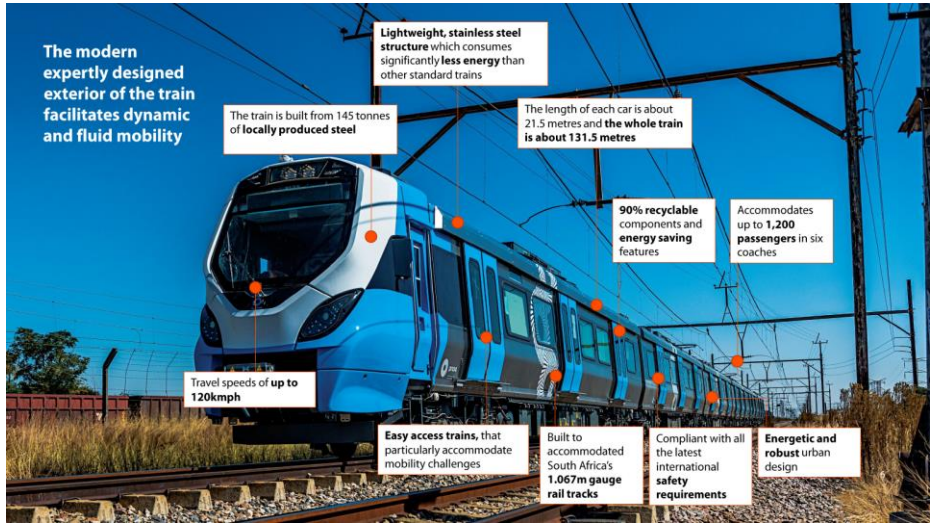
Project specifications have been completed for works to securitise the Metro South East lines (to Khayelitsha and Kapteinsklip) with implementation of the project sub-elements currently in PRASA's Supply Chain Management process. These operating corridor securitisation projects are pre-requisite deliverables to protect any new signalling and power supply and transformer upgrading that will be installed.

8.3.1.3 New Rolling Stock Deployment

The first new generation rolling stock delivery program has been signed by Government and the Gibela Consortium. This agreement covers the manufacture of 3600 coaches over a ten-year period and constitutes fifty percent of the required new rolling stock replacement.

Twenty new generation trainsets were manufactured overseas (Brazil) while the new Manufacturing plant located in Ekurhuleni, Gauteng where local manufacturing commenced in 2018.

Two new generation trainsets have, to date, been deployed to the Western Cape to undergo testing within a coastal environment prior to deployment of further trainsets later in 2019.



8.3.1.4 Salt River Depot Upgrade

Tenders submissions have been requested for the upgrading of the existing Salt River Rolling Stock Maintenance Depot to accommodate the maintenance of both new and existing rolling stock until all existing rolling stock is phased out of operational service. The award of the successful tenderer is in process.

8.3.1.5 Enforcement

A tri-partite agreement between PRASA (Metrorail), the Western Cape Province and the City of Cape Town regarding the deployment of Cape Town Law Enforcement Officers in Metrorail was signed in April 2018. The purpose of the agreement was / is to deliver effective and efficient enforcement services through the optimal deployment of human resources and the application of technology in support of enforcement interventions to protect passengers and infrastructure.

8.3.1.6 Development Potential

Development initiatives associated with PRASA landholdings within the Bellville Station precinct create opportunities for collaborative joint planning and development that will create railway station environments that enhance the rail passenger's travelling experience. The resultant integrated modal interchange facilities ("mobility hubs" when future proofed) will strengthen the attractiveness of both public transport as a mode of choice as well as provide a development anchor at the heart of the Bellville CBD.

8.3.2 Passenger Rail Challenges

PRASA passenger rail services in the Western Cape have experienced a dramatic decline in service levels linked with significant passenger decline over the past ten years. This is attributed to a number of factors, including:

- Technology obsolescence
- Trainset availability and performance
- Vandalism of infrastructure and rolling stock
- Rolling stock arson resulting in a significant loss of rolling stock units
- Land encroachment

8.4 Passenger Rail Network Proposals

8.4.1 Policy Framework

Passenger rail infrastructure and service provision is currently governed by the Legal Succession to the South African Transport Services Amendment Act (Act 38 of 2008) and the National Railway Safety Regulator Act (Act 16 of 2002). As part of an on-going rail reform process, the Legal Succession Act created Transnet Ltd and the South African Rail Commuter Corporation from the previous South African Transport Services (SATS) in 1989. During this process the national railway assets were allocated to each organisation on the basis of majority track utilisation at the time. Mutual use, hire and interface agreements governed the use of assets and the relationship between the parties.

This rail reform process continued in 2009 with the creation of the Passenger Rail Agency of South Africa (PRASA) which assumed responsibility, under the auspices of the Department of Transport, for the SARCC, Metrorail, Shosholoza Meyl, Autopax together with Intersite Properties at that time.

Figure 36 indicates the railway network ownership situation in the Western Cape. Bellville Station provides the key nexus of network ownership.

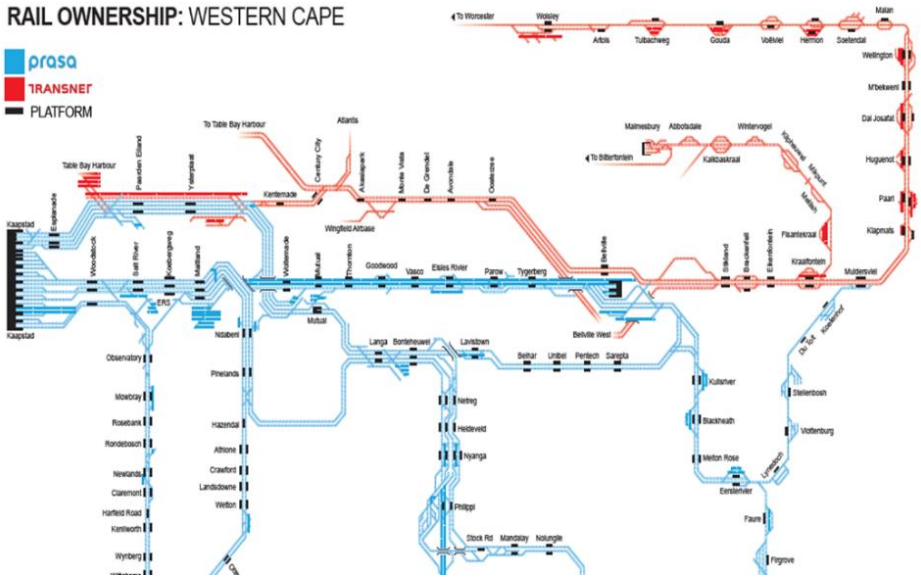


Figure 36: Western Cape Rail Network Ownership

The Draft White Paper on National Rail Policy (June 2017) indicates Government's intentions with regard to metropolitan railway networks.

The Draft White Paper reflects on reform intentions. *Inter alia,* the intentions include:

- The national railway network, both freight and long-distance passenger rail should be based on standard rail gauge (1435mm);

- Metropolitan railway networks should remain based on the Cape Gauge (1067mm)
- Urban Guided Transit (UGT), comprising a spectrum of responses including *"heavy metro, automated light metro and light rail, automated guided transit, monorail and BRT (s6.4.1)"* should be considered by transport planners. Further, *"The most appropriate UGT mode or sub-mode shall be deployed to optimally align public transport solutions with transport demand in each urban corridor"* where the solutions adopted should *"as far as reasonably practicable, … be future-proofed"* allowing a mode/sub-mode progression without major adaption.
- With regard to urban rail devolution, the Draft White Paper on Rail Policy notes an intended phased approach *(s6.4.6):*

  i. The DoT will develop a devolution strategy in alignment with the Integrated Urban Development Framework

  ii. Municipalities will then be capacitated, as necessary, prior to devolving operational subsidies to be managed as part of their Comprehensive Integrated Public Transport Plans while PRASA continues to manage operations and maintenance of their urban systems

  iii. Following the above, the next phase of urban rail reform will be "*the assignment of responsibility for managing all urban rail functions to metropolitan municipalities, including planning, funding, procurement, operations and maintenance. This will occur after the completion of PRASA's current phase of rolling stock recapitalisation plan, noting that PRASA will manage the current rolling stock recapitalisation program until the last contract has been executed (s7.3)"*

  iv. Noting the above, "*intolerable road congestion may require acceleration of UGT investment before the completion of PRASA's present recapitalisation commitments"*

  v. This policy position intends "*to provide opportunities for building rail and urban guided transit capacity in local government. Where appropriate, and necessary, PPP's should be used to concession routes, transfer technology and develop skills."*

The above overview can inform the Bellville CBD Transportation Framework. These include:

- Any interface of Standard and Cape Gauge railway networks will, most likely, logically occur within the Bellville node, strongly suggesting that Bellville Station may, in the medium to long future become the long-distance passenger rail terminal hub for Cape Town;
- Any longer-term re-gauging of freight lines to form a standard gauge high performance national rail network (shared nationally by long distance passenger rail) will impact on the freight rail networks supporting the Transnet site and the servicing of "back of port operations". This will need to be taken into account in any "station footprint" that is identified that would guide potential air-rights development;
- The treatment of BRT and urban rail needs to be viewed in the context of "Urban Guided Transit" solutions which should align with a natural progression of UTG modes and sub-modes. (heavy rail, light rail, BRT, street transit);
- The implications for accommodating long distance passenger rail (both public and private operations) would need to be accommodated at any proposed PTI envisaged for the Bellville node.

8.5 Light Rail Transport (LRT)

The EMME modelling has indicated that BRT capacity thresholds could be breached on the proposed Robert Sobukwe Road Extension (north-south) and Durban Road corridor.

A disused rail reserve ("the RACEC line") exists to the south of Bellville that extends southwards between the CPUT and UWC campuses, moving south across the CTIA into Philippi. This provides an opportunity to secure a dedicated LRT route as indicated in Figures 37 and 38.

8.5.1 Proposed Light Rail Route Alignment

The LRT development can be identified at a conceptual level, the alignment of which would require confirmation. While the preliminary strategic level modelling that has been undertaken indicates a logical connection between the Cape Town International Airport and Tyger Valley Centre, it also alludes to possible extensions to link with the metro south east.

Figure 37: Proposed LRT Alignment Phase 1

Two possible implementation phases are indicated.

- Phase 1 extending from the CPUT / UWC Campuses in the south, utilising the disused RACEC railway line right-of-way as far as the Bellville Station to Tygervalley Shopping Centre to the north via Durban Road and Carl Cronje Avenue;
- Phase 2 would entail the southern extension to the CTIA via either:
  - the Serepta Railway line and then following the proposed PRASA Airport Link alignment from the Serepta line to the airport terminal (see Figure 38), or
  - via the RACEC railway right-of-way to just south of, and then adjacent to the Stellenbosch Arterial to link with the proposed PRASA Airport Link alignment to the west.

These phases and alignments would need further testing and evaluation.

Figure 38: Proposed LRT Alignment Phase 2

8.5.2 High Level LRT Feasibility

The strategic modelling outcomes support further investigation of a technology change response to LRT to address the public transport demand emanating from the end state land use that is envisaged.

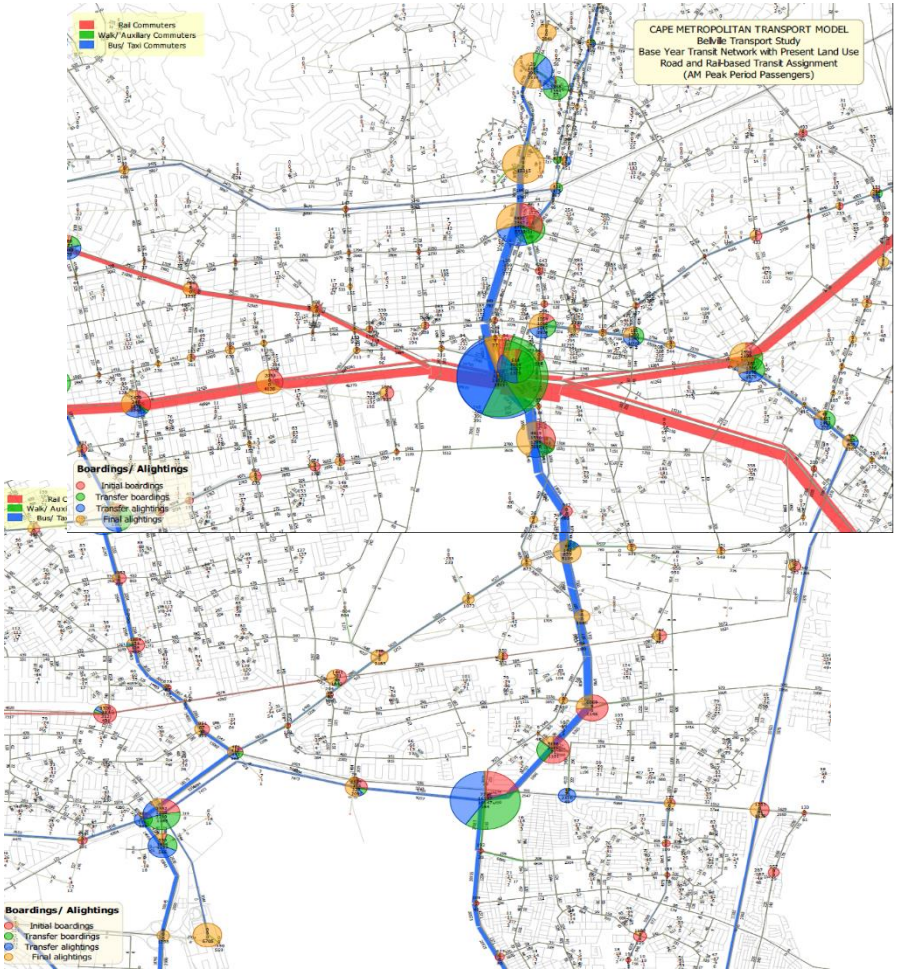


Figure 39: LRT End State Demand Plots

Figure 39 illustrates the demand outcome of an alignment that extends from the Cape Town International Airport in the south and moves via Borchard's Road, Robert Sobukwe, Stellenbosch Arterial, Symphony Way (passing between the University of the Western Cape (UWC) and the Cape Peninsula University of Technology (CPUT) along a disused rail right-of-way (the RACEC line).

A number of observations can be made:

- The introduction of a LRT mode into the modelling process, has had a significant impact on the split of demand between the LRT alignment and that of T13 along Robert Sobukwe Road / Durban Road corridor;
- The level of support for the BRT alignment is significantly reduced to the point where such a technology response can be questioned. This would require a systems planning response that considers a more comprehensive review of the public technology responses to determine the most appropriate technology;
- The potential extension of the LRT southwards from the CTIA towards the MSE would also need evaluation.

8.5.3 National Treasury PPP Process

The development of the business case(s) to determine the technical, financial and economic feasibility, will be framed around the understanding that such a project would require private sector involvement and participation and would therefore need to be compliant with National Treasury's PPP Manual's Project Cycle and the associated PPP Practice Notes. Refer to the PPP project cycle in Figure 40.

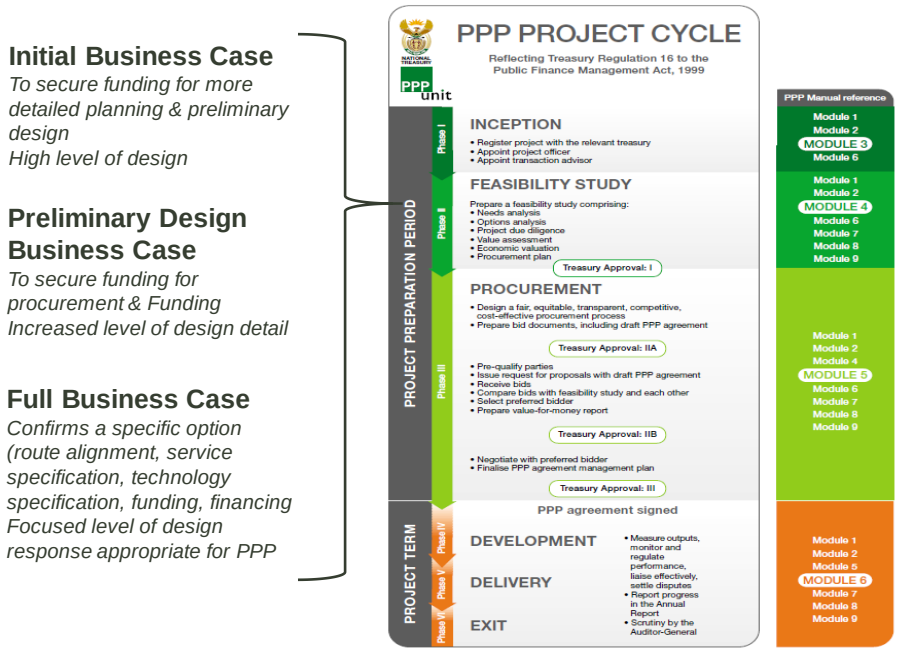


Figure 40: National Treasury PPP Project Cycle

8.6 Road Based Public Transport Timeline Context & Informants

An optimised road based public transport system, supportive of passenger rail and providing focused trunk, feeder and community services, is the second public transport element that is necessary to ensure that an effective and supportive platform is provided for urban development in the Bellville CBD. This situation does not exist at present. Several interventions will be critical in ensuring that such a system materialises.

The City's current IPTN Implementation Plan (v3, 2017) reflects an envisaged BRT roll-out in a timeline window, associated with the Bellville node, of ten – fifteen years. Unless roll-out priorities are amended, the current progress being made on the delivery of the BRT system, strongly suggests that a more pragmatic and realistic delivery timeline will be twenty years-plus.

This implies that the current bus and mini-bus taxi services will need to be accommodated and managed over this period, but in a materially different manner.

Given the City's focus on providing levers and interventions that accelerates the renewal and redevelopment of the Bellville CBD core and re-instils developer confidence in the City renewal intentions, the transformation of road-based public transport into an integrated public transport system that provides the appropriate level of spatial, temporal and frequency responses, requires to be accelerated.

Road based public transport, associated with the Bellville node, is currently provided by a subsidised scheduled bus service and a non-subsidised mini-bus taxi industry that is, for the most part, operating under Operating License mandates although there is a substantial number of illegal operations using the facilities.

8.6.1 Mini-Bus Taxi Transformation

The City of Cape Town has embarked on an engagement with the Taxi industry elsewhere in the Metropole, that has resulted in the voluntary formation of a Taxi Operating Company (TOC), formally employing all drivers within the company, and that is providing scheduled services on all routes that are currently operated.

The City has supported this initiative with skills development assistance.

The initiative has provided initial encouraging, but somewhat limited, outcomes including, *inter alia,* the formal appointment of staff within the company, scheduled services and significantly improved vehicle utilisation. No financial outcomes are available due to non-disclosure agreements that have been signed by all parties.

While this initiative constitutes a significant step forward in the transformation of the informal mini-bus taxi industry, it does not address a number of fundamental issues, including, *inter alia:*

- The lack of control the transport authority has over the level of service being provided, especially in the off-peak periods;
- The lack of formal integration with other services and modes;
- The inability of the transport authority to influence fundamental routing responses aligned with the roll-out, or pending roll-out, of its IPTN network;
- The inability of the transport authority to influence the re-capitalisation of the fleet being operated that allows for better service optimisation and universal accessibility, and
- The inability for the transport authority to accelerate the industry transformation process due to the voluntary nature of the process being followed.

To accelerate the transformation of the mini-bus taxi industry operating to/from the Bellville node and Public Transport Interchange, requires a more pro-active approach that is founded on four key interventions:

a. The completion of a systems planning initiative that addresses the feeder / community route networks necessary to support public transport trunk routes (IPTN); and

b. The initiation and progression of a formalised engagement with the Mini-bus Taxi industry focused on the creation of formalised public transport companies providing scheduled feeder / community services that would be partially or fully subsidised;

c. Negotiations with existing scheduled bus contract service providers to provide enhanced levels of bus service;

d. The integrated formalisation of road-based public transport services (both bus and mini-bus taxis) and integration with passenger rail recovery and renewal initiatives.

8.6.2 Subsidised, Contracted Bus Services

Contracted, subsidised bus services are provided by GABS, with subsidy administration by the Western Cape Provincial Government. These services are currently not formally integrated with the other public transport services.

Given the timelines associated with the transformation of the mini-bus taxi industry, the current scheduled bus services need to be enhanced through value added service offerings.

8.6.3 Inter-Town / Inter-City Passenger Services

While the above review has focussed on “urban public transport services”, the requirements associated with inter-town services (Paarl, Stellenbosch, Wellington, Atlantis etc.) as well as the long-distance inter-city bus services and long-distance mini-bus taxi operations cannot be ignored.

Although not forming a direct part of the current mandate, cognisance of these services needs to be taken into account in the “future-proofing” of any public transport interchange that materialises for the Bellville CBD core.

Given advances in transport technology, any public transport interchange concept that is developed, will need to be flexible enough to be able to transform, over time, into a “mobility hub” that can accommodate an emerging “new mobility” paradigm – a bundle of transport, technology and mobility changes that will become the bedrock of future transport systems.[4]

Road based public transport responses to support the urban renewal and regeneration of the Bellville CBD must take account of the IPTN planning that has been undertaken by the City of Cape Town as well as the emerging engagement initiatives with the mini-bus taxi industry relating to the initiation of road based public transport transformation.

[4] WSP, New Mobility Now, A Practical Guide, 2017

8.6.4 Public Transport Considerations

Several factors have emerged from the review of the road based public transport delivery intentions and the associated strategic level modelling that has been undertaken:

- The intended roll-out of BRT services associated with the Bellville area, are currently under review. The current IPTN Implementation plans notes the Trunk Route 13 (T13) (running from Mitchell's Plain in the South through the Bellville CBD to Durbanville in the north), has an intended delivery timeline of some ten to fifteen years. Trunk Route 14 (T14) (running from Westlake in the west to the Bellville PTI) is intended for delivery within a fifteen to twenty year timeline envelope.

  Given the current progress on Phase 2A, these timelines will, in all probability, be extended with any IPTN review, to reflect a delivery envelope of some fifteen to twenty years for T13 and more than thirty-five years for T14.

- The implication of this BRT delivery extension is that road based public transport responses over the next fifteen to twenty years, will need to accommodate the current form of service delivery. Road based public transport services will need to be developed going forward through "street transit" – i.e. integrated service provision by existing bus service providers together with the mini-bus taxi industry but in a different format.

- The current road based public transport service provision and infrastructure environment status quo is not conducive to promoting developer confidence in urban renewal and regeneration. There will need to be an accelerated transformation process of the mini-bus taxi industry ahead of any IPTN delivery intention. Such a transformation will necessitate committed negotiations with the mini-bus taxi industry to progress towards the formation of Public Transport Companies (PTCs) by the mini-bus taxi industry that provides contracted road based public transport scheduled services on a clearly specified network of routes that are partially or fully subsidised by the Transport Authority.

  Current bus-based services would also warrant review with a view to providing enhanced quality services ("Quality Bus") under the auspices of the Transport Authority.

- The rate of transformation of the road based public transport sector serving the Bellville economic node, will be a key determinant in establishing a level of investor confidence to invest in infrastructure investments that will drive urban and economic renewal of the Bellville CBD core. Such transformation should not be a protracted process.

- The review of the location, form and layout of an integrated interchange accommodating road based public transport and passenger rail services should reflect a clear intention of ensuring seamless integration. To give effect to the productive land release of the existing PTI location, preference should be given to a consideration of a vertically integrated facility located over the Bellville Station.

  The timing as to when such a land release would be most beneficial will dictate the delivery timeline of an integrated modal interchange facility.

- A vertically integrated modal interchange facility will require a detailed assessment of the operational needs, and therefore the sizing of such a facility with a likely consequence for remote holding areas and / or multi-functional depot facilities that are incrementally developed to full functionality over time.

- A public transport decision gate is emerging from the public transport strategic modelling that has been undertaken using the end state land use. This is that the capacity thresholds associated with BRT systems will more than likely be breached necessitating a consideration of a public transport technology step change from BRT to light rail transit (LRT).

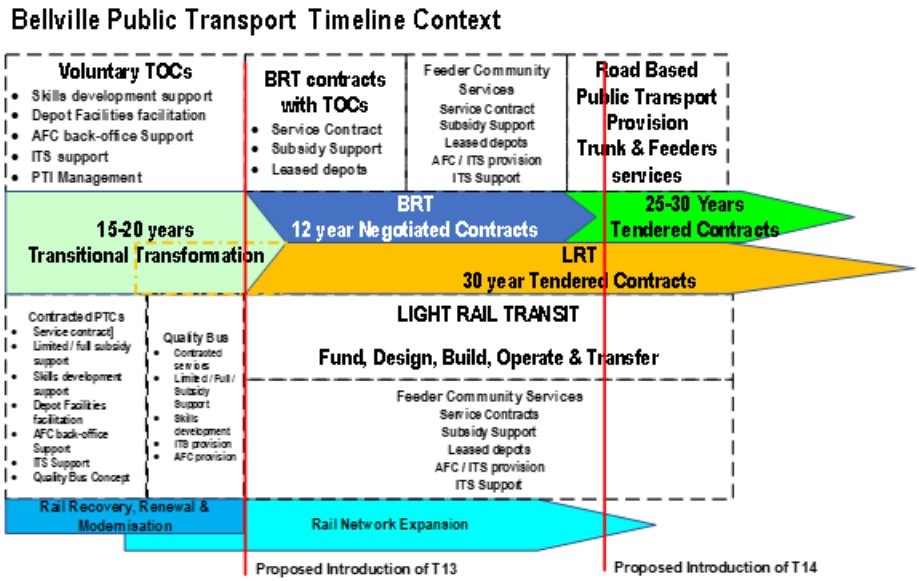


Figure 41: Public Transport Timeline Context

8.6.5 Road Based Public Transport Rail Recovery Support Program

A protracted passenger rail recovery program will impact on the level of road based public transport response that would be required to compensate across the transitional rail recovery timeline.

Responses for consideration include:

- A non-response, accepting the current status quo (This response is not acceptable but reflects a base case);
- A systems planning review of feeder and community services that provides a base for determining required route networks that would form the basis of any negotiation with the Mini-bus taxi industry;
- The initiation and progression of formalised negotiations with the mini-bus taxi industry to facilitate an accelerated formation of "public transport companies" to provide contracted scheduled feeder and community services that can be partially and / or sully subsidised;
- Negotiations with / without subsidy administration assignment to the appropriate level of accountability ("City of Cape Town") with the current bus contract service provider(s) (GABS) regarding an enhanced level of service ("service attributes") including increased frequencies, temporal ("hours of operation") and spatial coverage.

8.6.6 Public Transport Modelling Outcomes

Public transport modelling was considered from three perspectives:

1. The first is the traditional 4-step transit modelling outcome that differentiates between the different modes. This modelling approach requires that the "public transport routes" informs the assignment outcome. While informative at the strategic level, this outcome has limitations when considering localised feeder and community service networks that would be supportive of the trunk routes;
2. Building on the initial outcome which indicates BRT capacity thresholds have been reached, and breached, an LRT perspective was reviewed; and
3. The third perspective promotes an integrated public transport network development model that is based upon strategic logistics management principles ("free transit assignments").

A. EMME Transit Modelling

The EMME public transport model outcome is reflected in Figure 42. It reflects a strong role for rail while key BRT trunk routes through the Bellville core area reflect demands that begin to breach the capacity thresholds associated with BRT systems. This suggests the need to consider a technology step change from BRT to LRT responses.

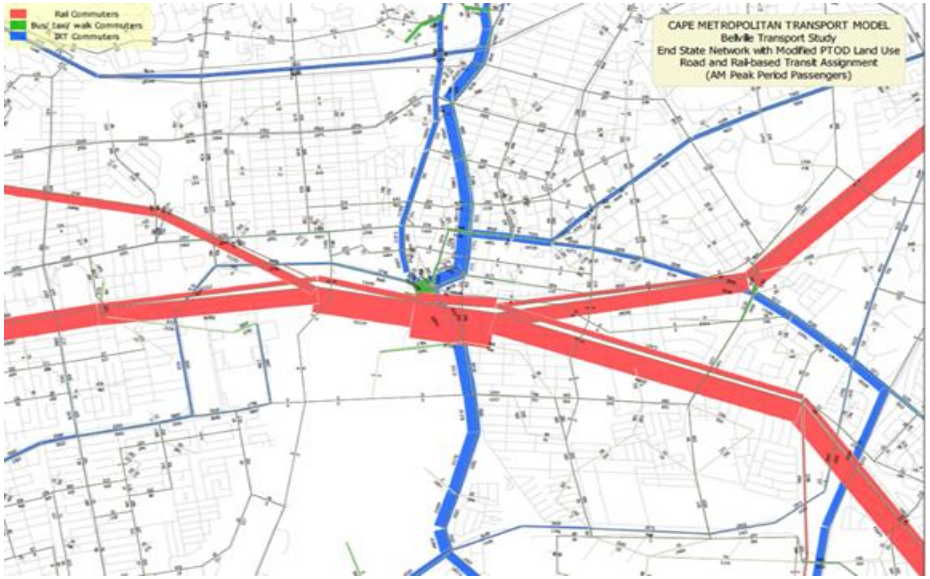


Figure 42: EMME/4 Public Transport Modelling Outcome (End State)

B. Light Rail Transit Modelling (High Level)

Exploring the suggestion that BRT capacity thresholds could be breached under End State land use conditions, Figure 43 illustrates the outcome.

There is a significant attraction to an LRT alternative network that calls into question the role of BRT within the area. This needs to be clarified and confirmed in a separate more refined modelling review.

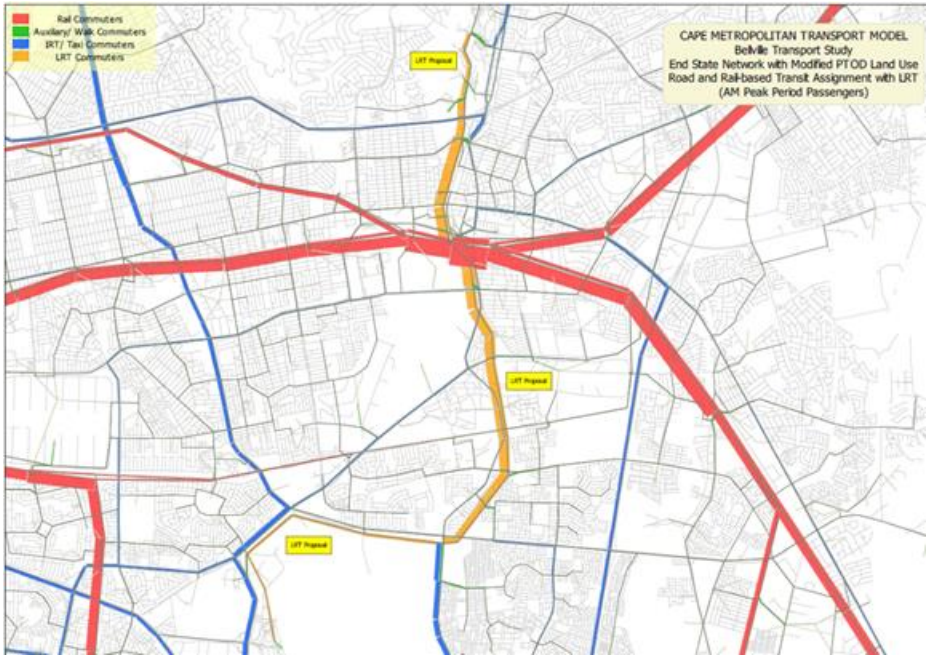


Figure 43: Light Rail Modelling Output (End State)

C. Public Transport Integrated Network Development Modelling

A different perspective was explored to ascertain the applicability of an alternative approach to determining an optimum integrated public transport network outcome. This approach followed the following process:

- A multi-class generalised cost assignment of both public and private transport onto the network, modified to be modeless to the public transport user; and
- Single class generalised cost assignments used to "focus" public transport demand to create corridors of public transport demand adequate to justify public transportation routes, while allowing for multi-period route design;

Figure 44 indicates the outcome of this process, one that applies across the full metropolitan network.

It is clear from this that there is sufficient demand to justify such networks but this would need to be carefully considered further as part of a more systematic systems planning initiative that would define appropriate route networks, mixed fleet requirements and associated costs.

Figure 44: "Free" Transit Assignment

9. Public Transport Interchange

9.1 Introduction

Discussion in this section focuses on the development of the PTI, or 'mobility hub' when future-proofed, for the Bellville CBD and the surrounding areas. Logically this is, and will continue to be located, in close proximity to, or at, the present railway station.

Currently the PTI comprises of;

- The Belville railway station which caters for local, inter-town & long-distance inter-city passenger rail travel. The station also accommodates freight through-traffic on the Transnet owned lines;
- The bus terminus used predominantly by Golden Arrow Bus Services, accommodating mainly local bus operations;
- The MBT rank which accommodates both local and inter-town MBT operations. Associated with the MBT rank are extensive MBT holding areas.

There are also secondary public transport related activities occurring in close proximity to the current PTI facilities which include park / kiss & ride linked to rail and limited metered taxi operations. Within the primary study area there is also long-distance bus operations that are presently removed from the central PTI and located closer to the N1.

Figure 45 below shows the spread of current modal facilities, and provides an indication of the average walk distances covered by passengers when transferring between the main transport facilities (rail, bus & MBT).

Figure 45: Existing PTI showing location of facilities

Figure 46 provides more detail on the facilities relating to road-based public transport, which includes the longer-distance MBT facilities, informal trading facilities, and public amenities provided for passengers & operating personnel.

Figure 46: Bellville PTI - Bus & MBT facilities (Bellville Operational Plan, CoCT. March 2012)

The manner and extent of current passenger movement within and through the existing facilities is summarised in Table 19 below. The information is indicative and, in some respects, incomplete.

This information has been extracted from the modelling process and there is good reason to interrogate this more thoroughly.

Recent sensible information is not that readily available, nor broken down to the extent necessary to gain a satisfactory understanding of passenger movements. In many respects the data is somewhat distorted by reason of the significant decline in passenger rail service delivery during the past 5/6 years, and which has resulted in excessive MBT & private car use on the road network.

Of note is the fact that there is a considerable demand for passenger transfers between modes, and that the distances between the existing modal facilities, and the nature of the environment that must be traversed, is not conducive to the promotion of public transport.

As the nature of public transport operations has changed, notably in the past few years, there has been increased demand for land for the parking of minibus taxis during the off-peak periods, which exceeds some 650 vehicles parked daily.

The fact that considerable land is consumed by providing for the parking of MBT's which is poorly managed & maintained, contributing to the areas is becoming unsafe, and therefore resultant levels of surrounding urban degradation that is of concern.

The net value yield from this real estate developed must logically be questioned.

9.2 Future public transport typology mix

Besides providing for local public transport movement needs, there are differing views on the range of public transport services that should be accommodated.

Table 18 below provides an indication of the public transport currently provided for.

Given the anticipated end state public transport travel demand, it is expected that the mix of public transport vehicle types passing through the Bellville PTI will change over time.

Table 18: Public Transport Typology Mix

Passenger transit category	Present PT vehicle mix	Possible future PT vehicle mix using PTI
Rapid Transit (Heavy Rail Transit)	Local & long distance	Local & long distance, including the prospect of high-speed rail
Semi-rapid transit	None	Limited light-rail (LRT) service Bus rapid transit (BRT) – two routes identified
Street Transit	GAPS local services	Contracted inter-town, main & community (or feeder) services. Inter-city bus (privately operated)
Paratransit	Minibus taxi local & longer distance inter-town services Limited metered taxi & taxi e-hailing	Limited metered taxi & much increased taxi e-hailing.

Besides catering for increased local passenger movements required in support of the densification and increased land-use intensification within the study area, there is the prospect of increased long-distance rail & road-based transport being focused at Bellville as a 'tourist'[5] gateway. Included is even the prospect of high-speed long-distance rail terminating at this location.

Given that the City is serious about the development of a more pedestrian / public transport orientated economic node, it follows that Bellville must develop and be adaptable to the accommodation of the full range of public transport modes such that it makes it possible for a passenger to access services that will enable him/her to reach any desired destination with minimal discomfort and safety risk.

The implication is that a range of services must be on offer to cater for the different markets which would include community, local and feeder services, inter-town and inter-city services, and include both rail and road-based operations. This accommodation forms an integral part of "future proofing" the current PTI to transform into a "mobility hub".

The aim must be, where possible, to minimise transfer walking distance and transfer time between transport modes.

It must also ensure that the space made available for walking seeks to minimise exposure to conflicts with other passengers, and more importantly with vehicular traffic.

With this must be the provision of amenities that will make the experience for both local & visiting passengers seamless and enjoyable.

[5] *A tourist being defined as anyone who is a 'stranger' and is unfamiliar with the local area. Can include persons travelling from say Malmesbury to an appointment in the Bellville sub-region, but also someone from any part of the city that seldom ever visits Bellville. This group can comprise some 25% of the daily people movement, hence stressing the relevance of good wayfinding.*

9.3 *Estimating future PTI passenger & people movement demand*

Figure 47 illustrates the end state passenger transfers that are envisaged.

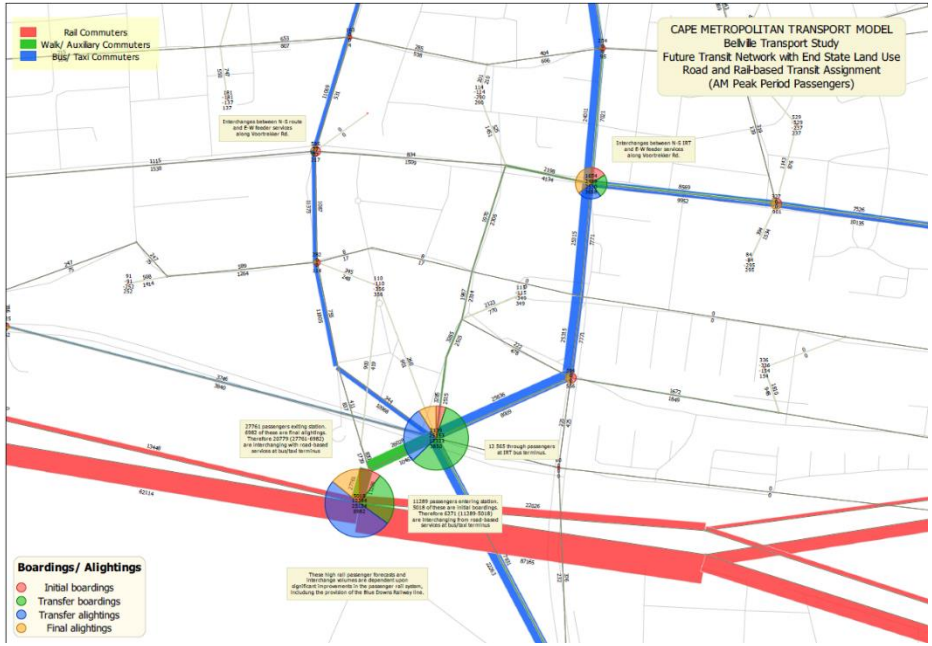


Figure 47: Passenger Transfers

Table 19 below provides a comparison between the present (base year) and 'end state' passenger boarding and alighting at the rail station and at the road-based bus terminus & MBT rank.

It should be noted that the table provides peak period figures, with the peak hour being some 40 to 60% of values indicated. The EMME/4 model is not currently configured to reflect the network and service operating and capacity constraints.

While the road-based facilities are presently separated, the expectation is that the PTI will strive to accommodate all modes at a single integrated location.

Table 19: Passenger Interchange Characteristics (AM Peak Period)

Boardings / Alightings	Base year situation (2018)		End state situation	
	Rail station	Road PT rank/terminus	Rail	Road PT terminus
Initial boardings	521	697	5018	2139
Transfer boardings	4404	20595	12294	25153
Transfer alightings	6389	18610	25124	12323
Final alightings	2145	5136	6982	3850
Totals	**13459**	**45038**	**49418**	**43465**

What these figures suggest is the following for the peak period:

The number of boarding and alighting passengers that must be accommodated within the PTI will increase from some 58 500 to approximately 93 000.

The number of passengers entering and exiting the PTI will increase from some 8 500 to 18 000 persons; this excludes the street-to-street person movement that must all be accommodated along the street-to-street linkage as well as in the station forecourts.

The number of rail-to-road public transfers (& visa-versa) will increase from some 8 600 to an envisaged 27 000.

There is considerable scope for express routes that bypass the proposed PTI, and which, if provided will reduce the scale of the PTI development.

The above figures have assumed that the future road-based operations will comprise a combination of BRT, 'quality bus[6]' and MBT.

The provision of mini-bus taxi services should be transformed to be a combination of BRT and 'quality street transit[7]', supplemented with an LRT technology response, as appropriate. This, in turn, will impact on the anticipated passenger movement demands that can be expected and that would need to be accommodated in the future PTI.

9.4 Locating the PTI

From an investment perspective, it can be argued that the lowest cost solution to the development of the PTI will result from the building onto the facility that already exists.

But, as has been indicated above, this will perpetuate a situation where passenger walk between modes remains unacceptably long, tedious and risky.

In arriving at what is deemed to be the logical desired alternative of a multi-layered, integrated PTI located within the existing railway station precinct, which is recognised as being the costlier solution, a number of alternative approaches have been examined.

These alternatives include:

- An examination of alternative access arrangements to the existing bus terminus & MBT rank that would provide for the future redevelopment of the 'Paint City' area, but simultaneously allow opportunity for BRT, inter-town & inter-city bus operations;
- The provision of a separate elevated BRT station with access off the Tienie Meyer Bypass that would improve passenger linkages to rail, but with the remaining facilities where presently located;
- The introduction of an elevated, and integrated PTI for all road-based public transport associated with a relocated rail station concourse and access arrangement linked with a generous street-to-street pedestrian facility linking the northern and southern station forecourt precincts.

Each of these has been informed by earlier work undertaken by the CoCT, or by consultants commissioned by the CoCT, and re-examined to determine suitability.

Assumptions pertinent to these considerations include;

- The long-term growth potential of the Bellville CBD will be informed and impacted on by the non-motorised & public transport solutions as the primary people modes, followed by goods delivery, and finally, private vehicle access;

  It must be stressed that the introduction of quality public transport service delivery is seen as a catalyst to socio-economic change[8], urban rejuvenation and future sustainable liveable city growth;
- The mix of road-based public transport services and vehicles should be responsive to route passenger demands; selected and managed to provide the most cost effective public transport solution with the aim of minimising the cost burden on both the passengers and the subsidising authorities;
- PTI facilities should be located where operational efficiencies are achievable, and that as land values in a CBD environment are potentially high, the holding of public transport vehicles (be these rail- or road-based) within the PTI should be minimised;
- the PTI will eventually operate as a 'closed' facility, and that all ticket purchasing, verification & cancelation will be done off-vehicle;

[6] *Quality Bus is referenced to the notion of a revised GABS operation, which is operated together with BRT & MBT's.*
[7] *Quality Street Transit refers to a desired longer-term outcome that is the product of a transformed contracted PT system, properly managed by the Transport Authority.*

[8] '*Good public transport should serve both the rich & the poor' (Private sector participation in LRT Metro Transit Initiatives: C Mandri-Perrott: PPIAF/World Bank)*

- Provision being made for a remote holding site (removed from the transport hub), but sufficiently close to minimise 'dead' kilometrage costs. Such a holding area could be incrementally converted into a permanent depot for road based / LRT operations.

9.5 Sizing the PTI deck footprint

Whether located at ground level, or elevated, the PTI "footprint" must be determined. This is a product of a range of variables that considers the public transport stops arrangements, vehicle circulation, routes serviced, passenger alighting's and boarding's, and passenger circulation to mention a few.

A further consideration relates to the influence that the public transport vehicle mix would have on eventual sizing of the PTI, as no comprehensive public transport system design (operations analysis) has been undertaken to confirm the final size requirements.

That noted, the eventual road-based public transport vehicle fleet will, probably, comprise a combination of mini, midi, standard & single articulated buses.

It can also be assumed that there should be minimal, or no passenger / road based public transport vehicle conflicts on the PTI deck, which implies that passenger grade separation should be a consideration.

Flowing from this, is the idea of having an internal PTI layout comprising a series of 'narrow oval islands'[9], with 2-way public transport vehicle operations catered for.

As a point of departure, an island platform width of 10m has been adopted, together with lane widths of 8m for 2-way bus operations and a stop width of 3m.

As a multi-island arrangement is contemplated, this should provide sufficient opportunity for bus turning at the island platform ends. The 10m wide islands, which can be compared with the standard 9m rail station platform widths, allows sufficient width for the accommodation of walkways, stairs or escalators, passenger circulation and waiting areas, and roof or other top-structure support columns.

Figure 48 illustrates island modules for the independent arrival & departure of a standard 12.5m standard and 17.5m articulated buses.

International best practices suggest the adoption of three consecutive articulated bus stops & four consecutive standard buses to inform the island length, and thus the adopted minimum deck length of 135m.

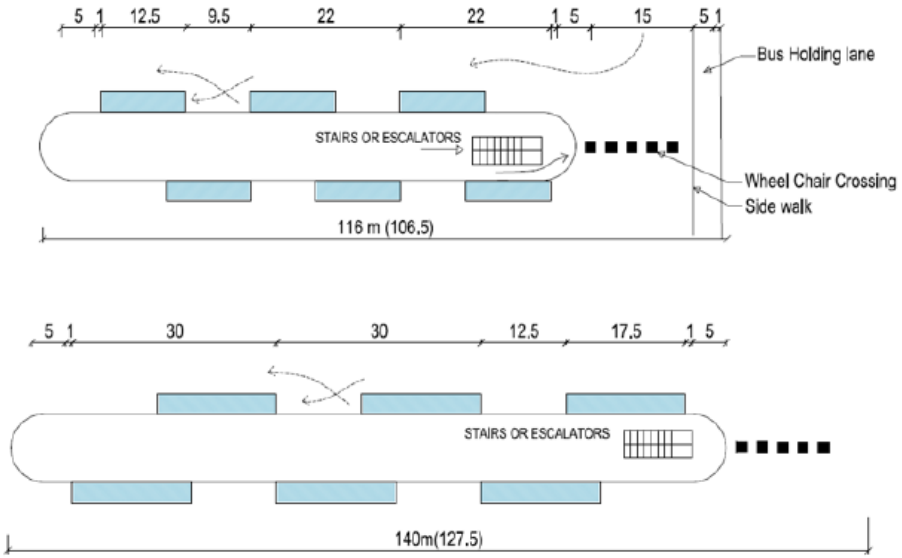


Figure 48: Narrow oval island modules

These best practices suggest that each bus stop could handle a range of 500 to 1000+ boarding passengers / hour[10], suggesting that an island module of this nature could accommodate between 3000 and 6000 boarding passengers/hr.

[9] *Bus Terminus & Bus Station: Planning & Design Guidelines: SARB / NDoT PG 2/85: Sept 1985*

[10] *The NDoT guideline suggests that the capacity of a bus stop could be as much as 1500 pax/hr under ideal circumstances*

This level of passenger accommodation makes a strong case to reject the notion of at-grade pedestrian crossings, suggesting the need for grade separation with the provision of stairs or escalators.

The number of bus stops needed, and in turn the number of island platforms must be informed by operational matters that include the number of destinations to be served and passenger alighting's & boarding information.

These layouts provide a high-level operational response to the number of bus stops required at this early stage in the conceptual planning processes. This is very much dependent on the envisaged future role of the MBT industry, the development of the BRT related network, and the renewal of passenger rail.

The deck width is informed by;

- its proximity to the existing and expanded railway station tracks & platforms; and
- the nature of possible future top structures (roofing and/or buildings, and associated column spacings) determined by a yet-to-be - undertaken air-rights development master plan.

Pending the outcome of such a master plan, a deck width of 112m has been adopted to allow for four narrow islands, 2-way bus circulation & holding opportunity along two sides[11]. This is illustrated in Figure 49**.**

How such decks might be positioned and used to accommodate a transforming public transport operation will require more detailed investigation.

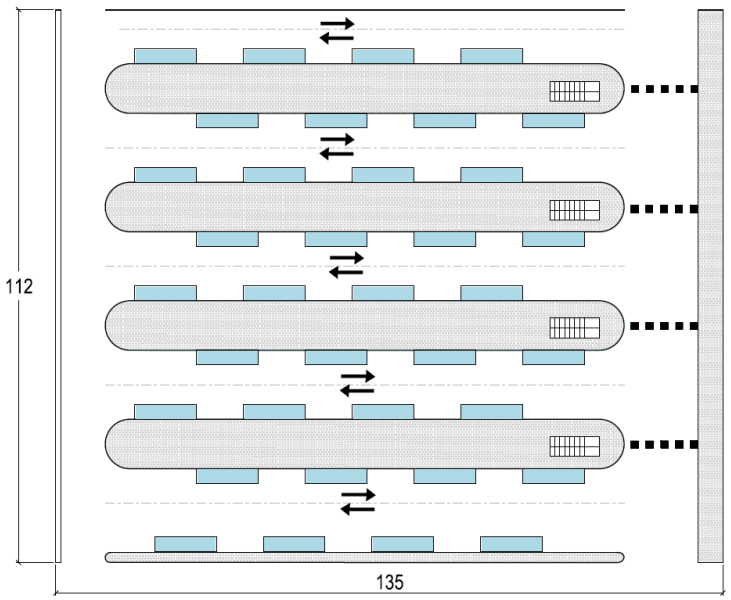


Figure 49: Four narrow island deck configuration for bus operations

[11] The deck width could be reduced to 88m supporting 3 islands.

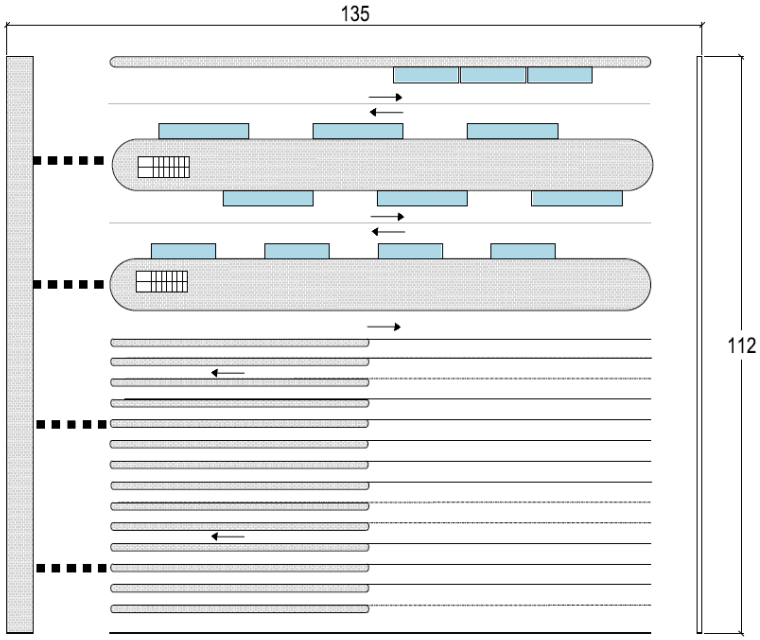


Figure 50: Combined narrow bus island & BMT rank

Figure 50 reflects a combination arrangement that makes provision for a mixed operation that can be re-arranged as the taxi industry is transformed to a formalised mixed fleet operation.

9.6 Locating the PTI deck relative to station & adjacent roads

The location, and size, of the any decking arrangement will be informed by:

- issues of pedestrian and vehicular access;
- the range of activities (transportation related & other land-uses) that must be accommodated;
- the physical constraints of the various transport modes; and
- urban design and place making informants.

Urban design and placemaking responses need to ensure adequate emergency evacuation space for people.

Ultimately there could be some 60 000 persons (excluding passengers on a Public Transport unit) walking within / through the PTI during a weekday morning peak hour that would need to be accommodated in open spaces to the north & south of the PTI.

A starting consideration is the location of what might be the centreline of the future elevated rail concourse / street-to-street access facility, that will provide passenger access to all transport modes, as well as the street-to-street access for pedestrians. The concourse would also provide level access facilities to all ticket sales areas, public amenities, access control facilities and supporting management offices.

Figure 51 provides an illustrative (in the absence of detailed surveys) section drawn along the selected concourse centreline and indicates the relative positions of the Tienie Meyer elevated bypass, the street levels, the position of and height restrictions above the railway station.

Figure 52 indicates possible PTI deck locations which could abut the Tienie Meyer Bypass, or be removed from, but linked to, the bypass by way of an elevated roadway (the latter option increases the extent of public (evacuation) space needed). The relative location of a below ground Light Rail Station is also given should this become a consideration.

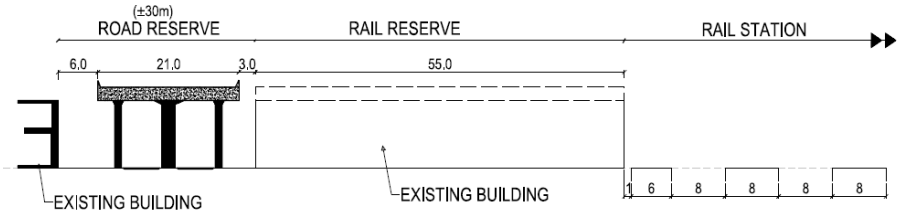


Figure 51: Section along concourse centreline (approximate)

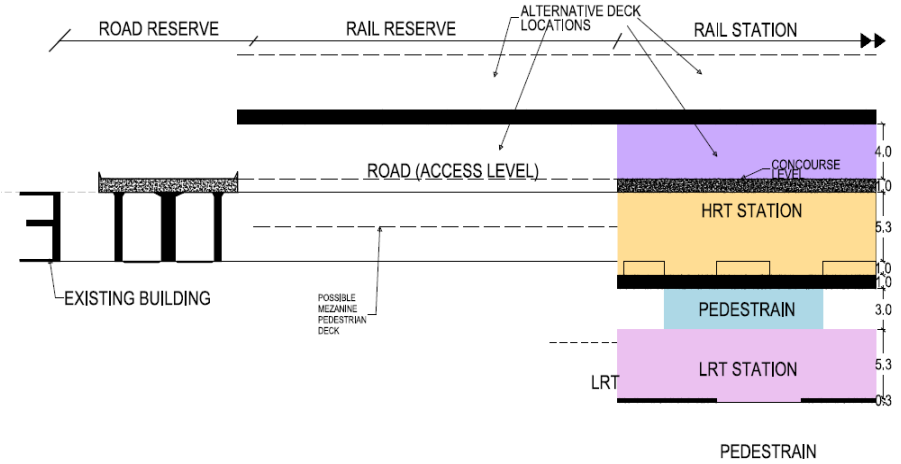


Figure 52: Section along concourse centreline showing alternate PTI deck locations (approximations)

9.7 Access to East Deck Option

Efficient pedestrian and public transport vehicle access to any elevated deck is fundamental to operational efficiency.

Two basic deck positions have initially been entertained, both of which accept that there will be an elevated concourse that will service both the rail system and provide for street-to-street pedestrian access.

The final position of this concourse would consider a combination of operational issues, together with urban design related informants.

There is also the option of having the road-based public transport deck at the same level as the concourse (level G+1 which results in at-grade pedestrian crossings of bus movements), or at level G+2 which would require grade separation access accommodation.

Given that the deck is located to the east of the concourse, a governing consideration is the location and gradient of road access from the elevated Tienie Meyer Bypass. Refer to Figure 53 below.

The Tienie Meyer Bypass access would be traffic signal controlled, and located some 370m from the Tienie Meyer Bypass / Robert Sobukwe Road intersection, compliant with the Province's road access guidelines[12] for a Class 2 Primary Arterial within an 'Urban' development environment.

Additional access can also be provided from Robert Sobukwe Road, and from the south via the Transnet site. If the deck is at Level G+2, then the Tienie Meyer access link gradient approaches 7% over a short acceptable distance.

[12] 2016 RAM

Access from the south of the deck via Robert Sobukwe Road and a potential future link to Landros Road extension become a possibility for further consideration.

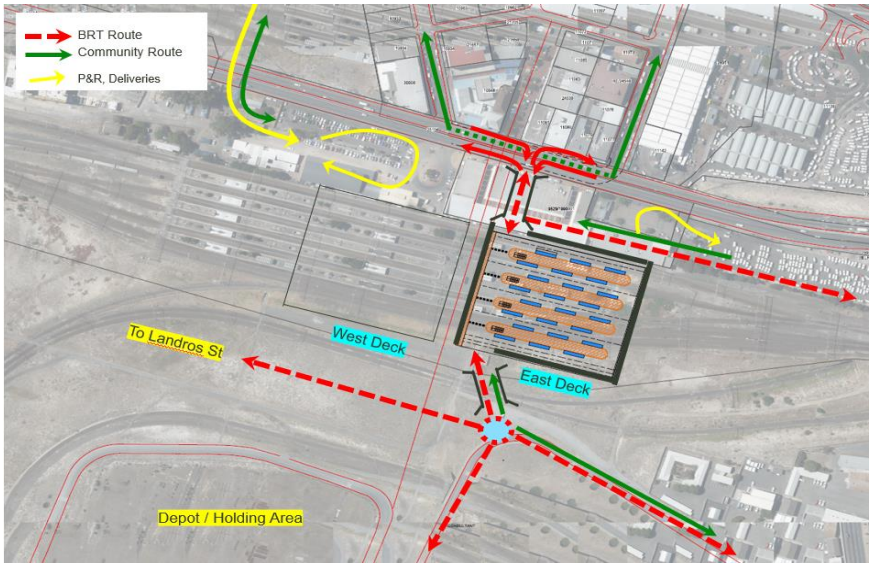


Figure 53: Access to East Deck Option

9.8 Access to West Deck Option

Alternatively, the deck could be positioned to the west of the street-to-street concourse as indicated in Figure 54. While this reduces the Tienie Meyer access link gradient (Level G+2 situation) and locates the access further from the Robert Sobukwe Road intersection, it precludes any direct access from Robert Sobukwe Road.

Advantages of this alternative include:

- The provision of coverage to a larger portion of the existing usable station;
- Urban public space creation in that the deck access link bridge required will be removed from adjacent to the concourse area;
- Access to the south is much as for the eastern alternative, with this arrangement likely to lessen the bus travel dead kilometre distance to the proposed holding / depot which could potentially be located to the Transnet site immediately to the south of the decking and concourse arrangement.

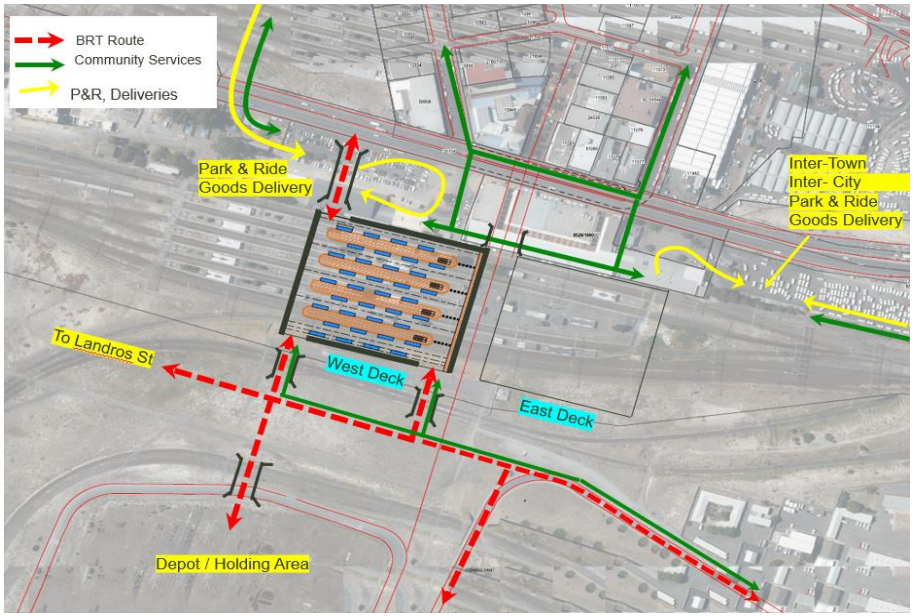


Figure 54: Access to West Deck Option

9.9 East and West Deck Options

In an extreme situation, consideration could be given to the establishment of two decks to accelerate the land release associated with the development of both the Paint City and existing PTI sites.

Such an arrangement could be seen to be viable as an interim arrangement, where the longer-term use is the lower floor of some top-structure development that could be indicated in the air-rights development master plan. Figure 55 illustrates this arrangement.

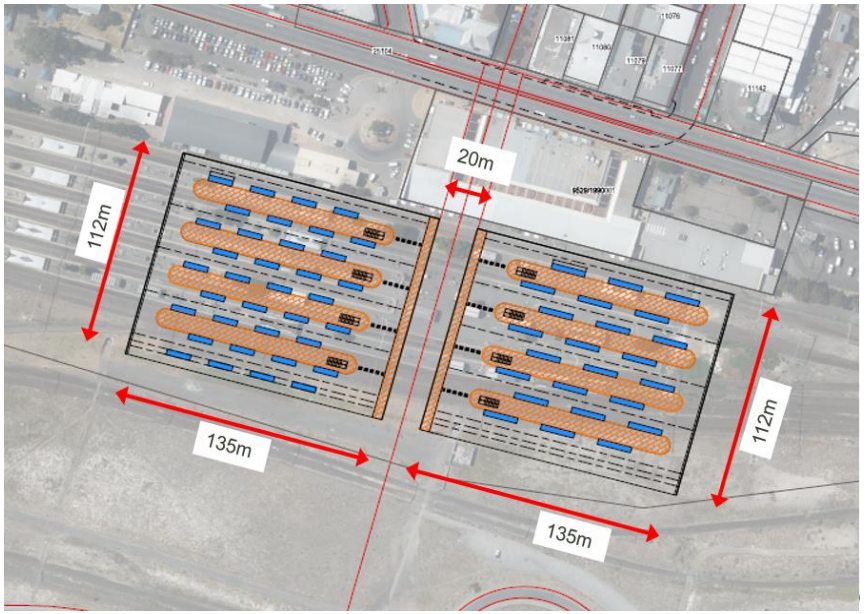


Figure 55: East and West Decks

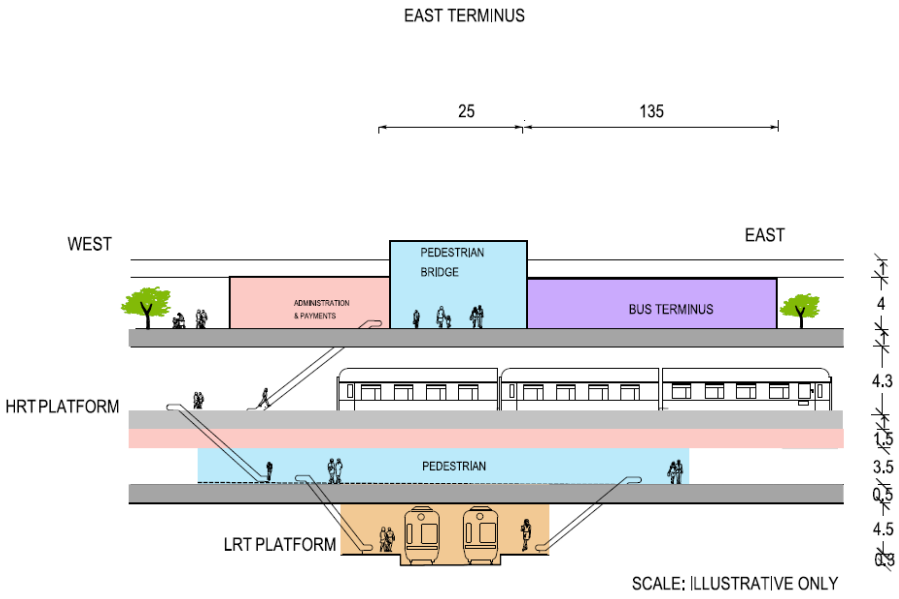


Figure 56: Longitudinal Section East Terminus

9.10 Longitudinal Section – 2/3 Level PTI

Locating the bus terminus deck above the rail station to the east minimises passenger transfer walk distances and allows for the better management of passengers in general. The schematic illustrated in Figure 56 shows three transit levels, which includes;

- **Level G[13]-1** - the potential to accommodate a Light Rail Transit (LRT) line with station diametrically crossing (along a north-south alignment) below the Heavy Rail Transit (HRT) station;
- **Level G** – the existing Heavy Rail Transit (HRT) station;
- **Level G+1** – the station concourse, administration & the bus terminus

[13] G – ground level (existing)

9.11 Longitudinal Section – 3/4 Level PTI

Locating the bus terminus deck above the rail station to the west also minimises passenger transfer walk distances and allows for the better management of passengers in general.

The schematic illustrated in Figure 57 shows five transit-related levels, which includes;

- **Level G[14]-1** - the potential to accommodate a Light Rail Transit (LRT) line with station diametrically crossing (along a north-south alignment) below the Heavy Rail Transit (HRT) station;
- **Level G-1P** - pedestrian mezzanine level;

[14] G – ground level (existing)

- **Level G** – the existing Heavy Rail Transit (HRT) station;
- **Level G+1** – the station concourse, administration facilities;
- **Level G+2** – Road Based Public Transport Terminus.

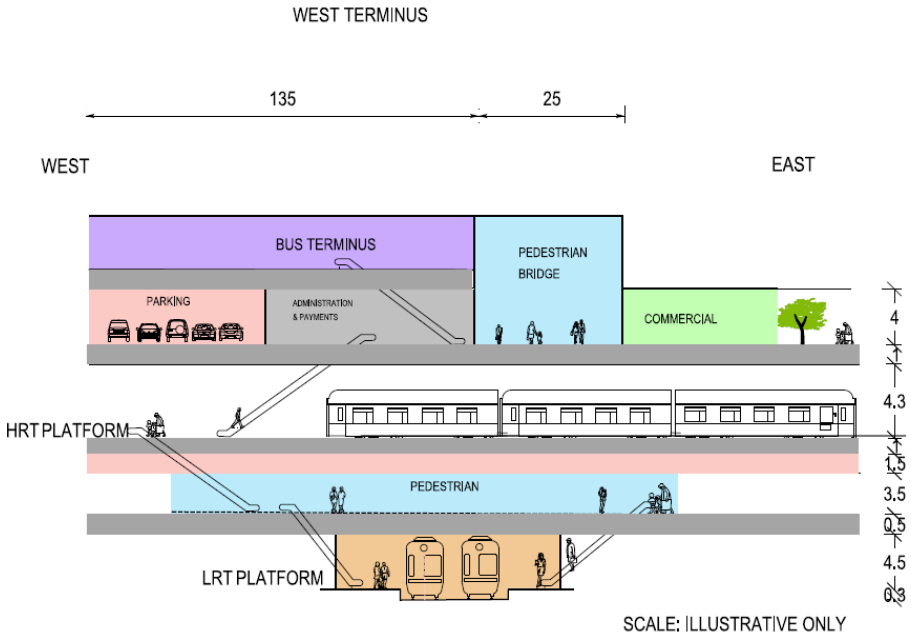


Figure 57: Longitudinal Section West Terminus

9.12 Provision for inter-town & inter-city bus operations

While the MBT industry already operate inter-town & some inter-city long-distance services from the rank at Bellville, there are no similar bus operations from this location.

The policy of the Western Cape Government, as presently being implemented in George is to operate services between George & neighbouring towns as part of the Go George system. These inter-town services will be replicated by operations established in the neighbouring towns as and when system transformation occurs in these towns.

Envisaged, in the Cape Town situation, might be a series of contracted inter-town services operating out of a few transport hubs, one of which would the Belville Transport Hub.

Other than PRASA's Translux and City-to-City, all inter-city bus operations are privately operated, with starting points at various locations within the Metropolitan area. Bellville is one such location, but the terminal is somewhat removed from the station area.

Going forward, as part of the intention to "future proof" the Bellville PTI as a future "mobility Hub, it would be logical to ensure that combined inter-town & inter-city service accommodation are not precluded from being incorporated adjacent to the proposed facilities that allow passengers to transfer to or from the local public transport services.

With the planned upgrading of the core area road network, incorporating long-distance services within Belville Transport Hub should not be precluded.

9.13 Providing for Park & Ride, Kiss 'n Ride, e-hailing & metered taxi

Deliberately omitted is the notion of Park & Ride within the Bellville PTI precinct. The reason for this is that, increasingly, access to a major travel mode, such as rail or BRT, should be by way of walking or feeder public transport. The financial and economic costs of P&R facilities simply cannot be justified or defended on potentially high value land.

The same logic partially holds for Kiss & Ride accommodation, but the provision of time constrained drop/pick-up & go operations is necessary.

However, such a facility would be shared with e-hailing & metered taxi type operations (with provision of some remote holding), corporate & charted services. Such facilities should be provided to both the north & south of the PTI.

9.14 Proposed Holding Area / Depot

Embedded in the proposals above is the view that there should be limited provision made for the short-term holding of buses (and/or MBT's in the pre-transformation phases). There are two main reasons for some bus holding within the PTI:

- The need related to bus travel time schedule adjustments, driver change-overs and other operational considerations; and
- The need to have buses ready in support of high bus stop utilisation, and in the event of bus break-down.

Over and above these requirements, will be the need to hold buses during the off-peak period either in a bus depot or remote holding area.

It will be some years before the conversion of MBT operations to formal bus operations is complete. During this transitional period, there will be a need to hold MBT's at a location removed from the PTI deck.

The cost of providing MBT parking spaces, with no economic return, on a costly deck structure is not affordable. By the same token, it would be unreasonable to expect all MBT's to return to their 'home' until needed during the off-peak demand periods.

To accommodate this operational requirement, it is proposed that a piece of land be sourced near the PTI that can be used as a MBT / Bus holding area.

With time, this facility can be incrementally transformed into a CoCT owned bus / LRT maintenance depot. It can be argued that the bus operation in the Bellville area would easily justify the provision of a bus depot accommodating some 250 buses in addition to the accommodation of any potential LRT service support that may materialise.

Figure 58 notionally illustrates what might be a suitable accessible holding / depot site located on Transnet land to the south of the proposed PTI.

To give scale to the proposal, a diagram of a 250-bus depot has been superimposed on the proposed site[15].

Figure 58: Possible Holding Area / Depot

[15] Shakti Sustainable Energy Foundation, Bus Depot Design Guidelines, 2017

9.15 Future Proofing

Technology change within transport in general and public transport specifically will materially affect the way in which transport will need to be accommodated in the future.

A new mobility paradigm is already emerging and will continue to develop, comprising a bundle of transport, technology and mobility developments that will become the foundation of future transport systems.

Universal information and mobile payment systems will aid travelers in selecting modes of transportation, optimal rates, and alternative transport services in the event of delays.

Travel system operators will be able to reach more passengers through selective dissemination of information and advertising.

Mobility hubs fulfil two roles[16]:

- **A transport role**—allowing for quick, efficient and seamless movement, as well as flexibility for infrastructure modification and expansion, one that does not preclude technology advances in the mobility paradigm; and
- **A placemaking role** - the mix of activities, and the people who use them, which makes the mobility hub a desirable destination.

When conceptual planning and detailed design is undertaken, these developments should form part of the brief.

[16] J Engel-Yan & A Leonard, Mobility Hub Guidelines: Tools for Achieving Successful Station Areas, 2012

10. Parking & Goods Loading

In support of the intention to rejuvenate the Bellville CBD, is the need to:

- review parking and goods loading policy, as it relates to a CBD in the metropole; and
- the status of the present related zoning conditions, and the realities of the situation on the ground.

Complementary to the notion of having a public oriented development environment, is that of ensuring an abundance of road space allocated to the movement and interactions between people / pedestrians, and the creation of public space.

Doing this facilitates a people first policy, the identification of pedestrian dominated roads and spaces, and the systematic decrease or total exclusion of private vehicles from these pedestrian areas.

Logically this should not be interpreted as meaning that there will not be a situation where vehicular traffic will not have limited access, particularly so for goods delivery, refuse removal, maintenance and emergencies.

The approach that should be pursued should consider;

- The declaration of the area as PT2 Zone, where it is permitted that on-site parking should not exceed the Town Planning requirement for such a zone;
- The declaration of an outer band as a PT1 Zone, where the parking requirement falls between the prescribed levels;
- The removal, as far as possible, of all on-street parking within the declared areas, and on all Class 3 and 2 roads within the study area;
- The provision of public accessible parking (on-street or lots) for which parking is charged. This to be based on an annually reviewed supply and demand assessment that ensures turnover and the ready availability of a limited percentage;
- The provision of access to any public parking area will avoid passing through pedestrian dominated areas. Refer to Figure 59.
- The comprehensive assessment of future parking requirements, that should include kiss & ride, e-hailing and metered-taxi demands;
- The delivery of goods, and removal of refuse which requires special consideration;
- With the prospect of the redevelopment of significantly large sites, there might be opportunity to consider the development of a central delivery terminal, and a combined surface and sub-terrain distribution network to serve the CBD core. The alternate to this is the review of both on- and off-site delivery zoning requirements and opportunities.

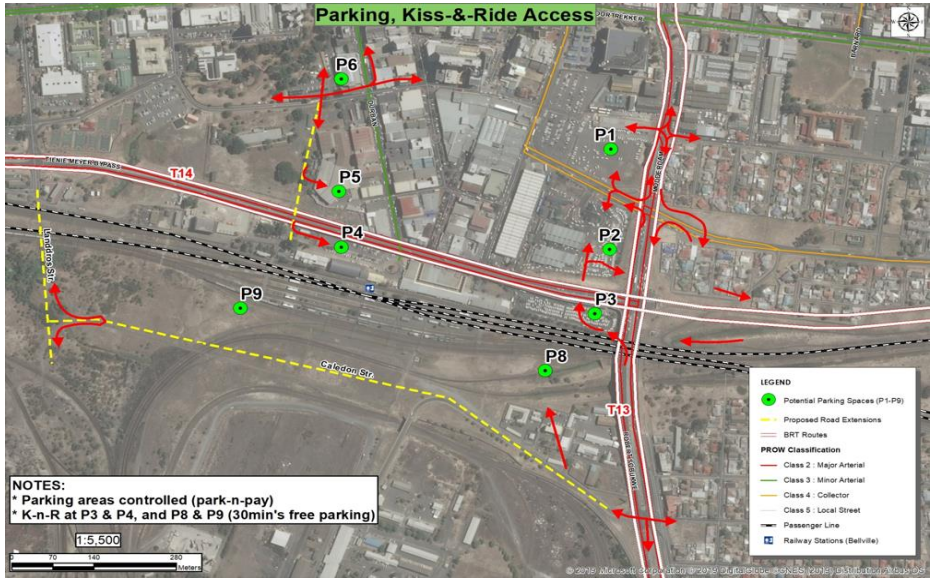


Figure 59: Parking

11. Intervention Sequencing

11.1 Urban Renewal

Figure 60 illustrates urban renewal intentions, the details of which will need to be confirmed in further urban design studies.

11.2 Road Based Public Transport Transformation

Figure 61 illustrates the road based public transport transformation intentions.

11.3 Passenger Rail (PRASA)

Figure 62 illustrates graphically the interventions required to renew and modernise PRASA's passenger rail services in support of the Bellville CBD renewal and regeneration. The interventions are indicated within the context of the four renewal / development objectives that reflect the different stages of renewal and development.

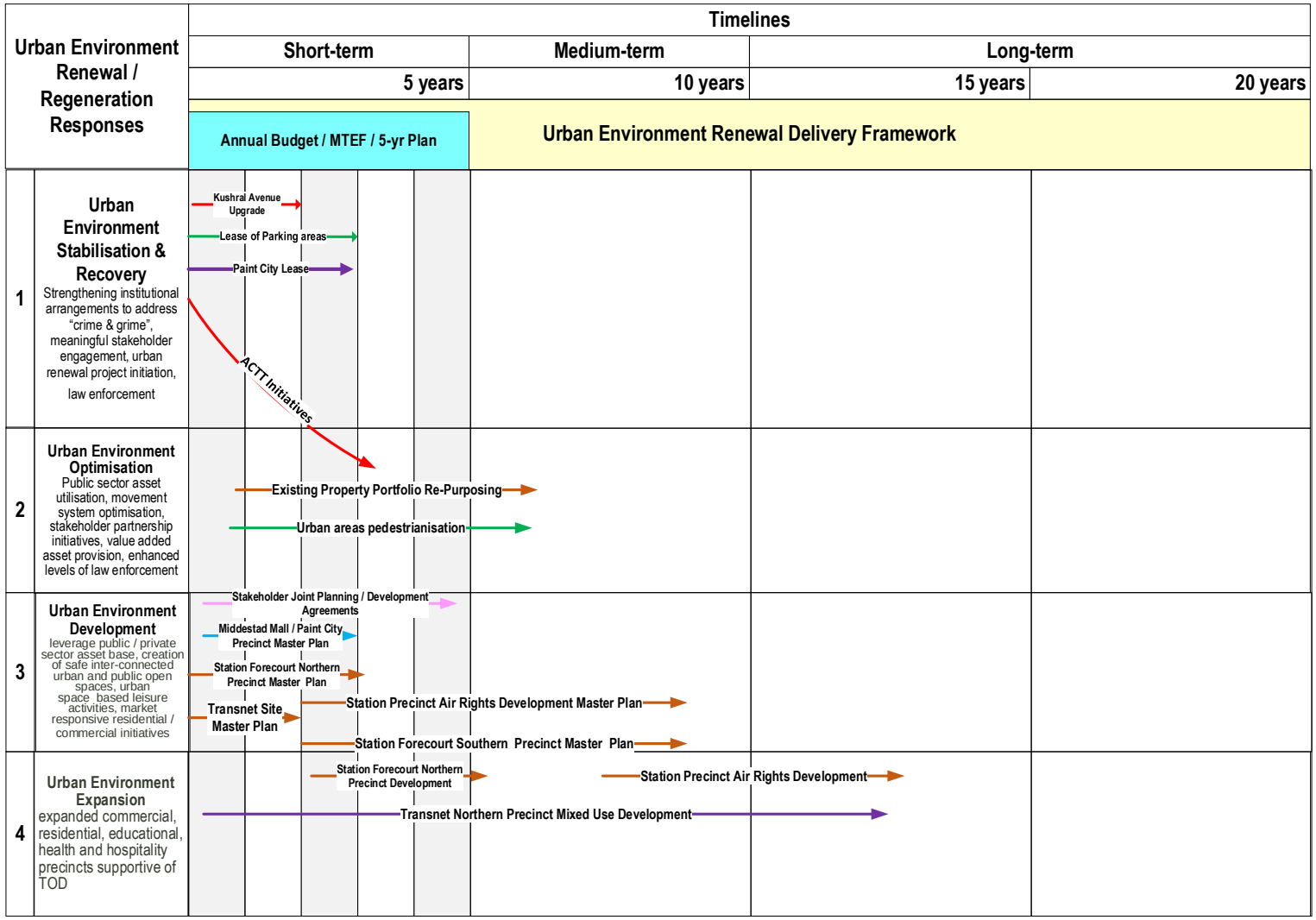


Figure 60: Illustrative Urban Renewal Intentions

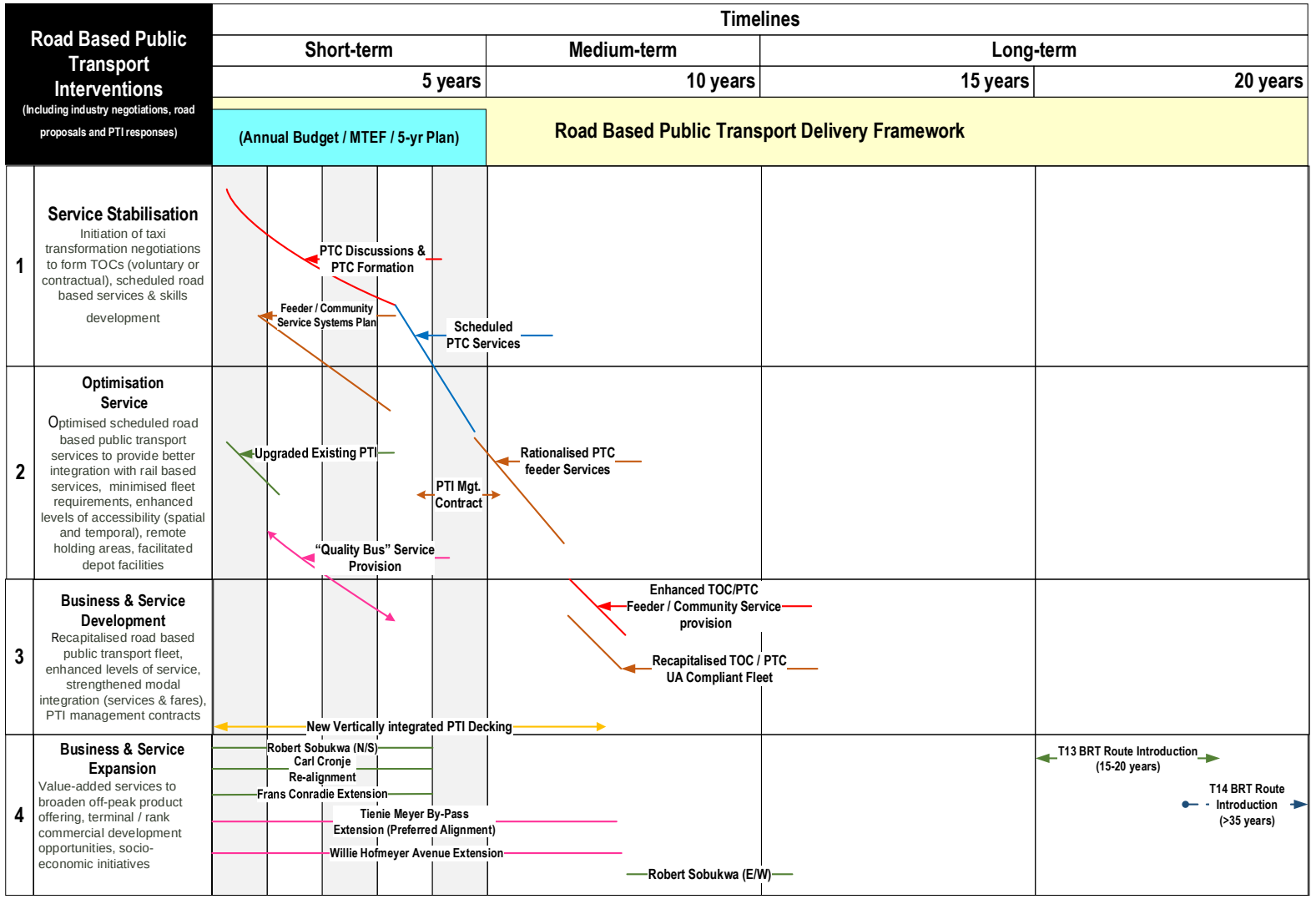


Figure 61: Road Based Public Transport Intentions

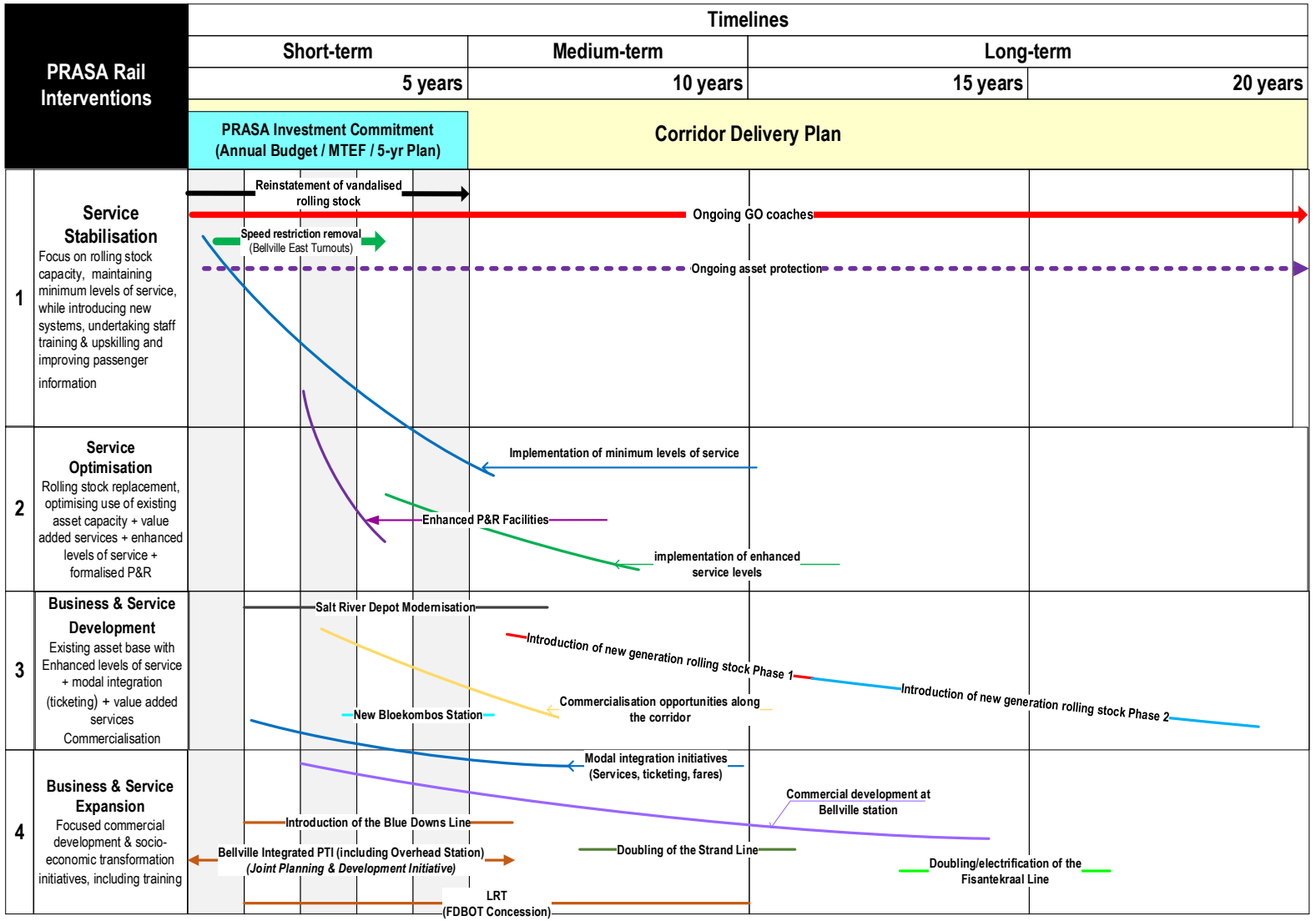


Figure 62: PRASA Rail Modernisation Interventions

12. Conclusions

In considering conclusions for the study, the complexity of balancing the "three pillars" of urban renewal, urban passenger rail renewal and modernisation and a transformed road based public transport system cannot be underestimated.

A full appreciation of the time frames associated with the advancement of each of these pillars, individually and in support of one another, emphasises this complexity and the need for clearly articulated roles, responsibilities and accountabilities.

It raises the necessity for institutional collaboration, across all spheres of government as well as with State Owned Companies / Entities, to give effect to integrated planning and delivery co-ordination that will, of necessity, span an extended period of time.

It also requires a carefully considered response to an informal sector of the public transport industry, the transformation of which is fundamental to the outcome that is envisaged but one which is fraught with challenges.

12.1 Land Use

12.1.1 Land Use Support of Public Transport

Land Use density has a marked effect on public transport policy responses required as well as on the economic effectiveness of public transport services that are provided. Conversely, without public transport being present, there is little prospect of urban densification and meaningful corridor development materialising.

Generally, net densities of between 90-120 persons per hectare (or gross densities of 30-40 persons per hectare)[17] are felt, internationally, to provide a density level that provides a reasonable base of public transport ridership support)[18].

For simplicity, four density ranges can be framed that relate to the "accessibility" requirements of particular urban locations:

- highly accessible localities adjacent to public transport interchanges should be between 80-100du/ha (200pph - 250pph - with an average household size of 2,5 persons / ha);
- Accessible localities adjacent to development corridors should be between 60-80 du/ha (150pph – 200pph);
- Within localities located 1 km walking distance from a corridor should be between 40-60 du/ha (100 – 150pph); and
- Within localities with densities <40 du /ha (<100pph), specified public transport policy responses are required (hourly frequencies, hours of operation) to support feeder services to nearby corridors and / or local or community services providing community access to community facilities (clinics, libraries, government facilities). Sight should not be lost of the fact that these services also provide access to domestic employees, who are often neglected in any consideration of public transport provision.

12.1.2 Public Transport Provision Policy Response

Where land use densities exist or are proposed in localities with less than a net density of 40 du/ha (100pph), a policy position on the provision of public transport services should be considered which will contribute to:

- Supporting the incremental densification / intensification of the spatial areas identified; and
- Providing a level of community accessibility that is responsive to identified needs.

[17] DOT, Integrated Urban Corridor Assessment and Strategy Development, 2001

[18] DOT, Integrated Urban Corridor Assessment and Strategy Development, 2001

12.1.3 Transnet Site

The nature of the envisaged economic renewal of the Bellville CBD as the second economic node within the metropole, requires:

- An acknowledgement by all affected parties that the land use typology associated with the overall Transnet site should be compatible with adjacent, and envisaged, land uses;
- The various road proposals, public transport interchange facilities, mixed use intentions and proposed depot facilities proposals should form formal informants into the Transnet Master Plan for the Site;
- The land use associated with the northern portion of the site (to the north of the proposed Fransie van Zijl extension and to the south of the Bellville Station precinct) should be supportive of high density mixed use development;
- Railway network optimisation (freight) and expansion (passenger) should be reviewed to minimise the railway network footprint and optimise the mixed use development footprint;
- The location of a public transport holding area / depot facility, within the northern portion of the site, should be confirmed to optimally service the envisaged vertically integrated interchange above the Bellville Station. Such a facility should be "future-proofed" to accommodate the incremental development from a bus / taxi holding area through to a fully fledged maintenance depot flexible enough to accommodate multiple operators, a mixed fleet and potentially LRT rolling stock;
- Engagement with Transnet on the emerging Transnet Site Master Plan to provide guidance on the land use intentions and the "back-of-Port" operational requirements for the site. Any relocation of site activities to alternative locations should be identified at an early stage as soon as possible to inform the urban renewal and public transport intentions for the Bellville node.

12.2 Public Transport

12.2.1 Urban Passenger Rail Renewal and Modernisation

Bringing urban rail passenger service provision back to its rightful place as the backbone of public transport within the metropolitan area, is fundamental to supporting the renewal and development of the Bellville CBD. Given that the renewal and modernisation of urban passenger rail remains, for the moment, the domain of PRASA, the following should be given consideration:

- Passenger rail service re-instatement to levels of service experienced at the time of the formation of PRASA in 2009 should form the minimum level of rail service recovery (i.e. 12-15 trains per hour between Bellville and Cape Town providing a peak corridor capacity of at least 25 000 passengers / hour);
- With the introduction of new generation rolling stock, a modernised signalling system, and a progressively modernised infrastructure base, enhanced levels of service supportive of the incremental redevelopment of the Bellville node should be provided. This modernisation should provide for a corridor practical carrying capacity of at least 45 000 passengers per hour;
- The strategic passenger rail network expansion intentions to accommodate envisaged rail network development along the Bellville – Strand corridor (quadrupling, including the incorporation of the Blue Downs line), the Bellville – Kraaifontein corridor (quadrupling jointly with Transnet Freight Rail) and along the Bellville – Cape Town corridor (4th line) requires clarification and confirmation to inform the PTI deck and Bellville Station air-rights development Master Plan;
- Confirmation is required from Transnet regarding intentions to address "back of port" freight operations support location and freight rail infrastructure requirements to inform the finalisation of the Bellville Station air rights development Master Plan (inclusive of the PTI ("mobility hub") precinct footprint) as well as the location and feasibility of a public transport

holding area / maintenance depot facilities within the northern Transnet Site precinct;

- The current northern corridor modernisation study being undertaken by the City should confirm realistic timelines associated with each of the above interventions that will bring clarity as to the urban rail renewal and modernisation delivery time frames and the associated implications for the Bellville CBD revitalisation;
- The outcome of the urban rail renewal and modernisation time frames will inform road based public transport transformation timelines and service responses.

12.2.2 Light Rail Considerations

The strategic modelling outputs (using the EMME/4 model), has identified a technology step change potential where the capacity threshold of the currently envisaged BRT trunk route provision will be breached, under end state land use and modal split assumptions.

This will occur within the north – south corridor between the Cape Town International Airport in the south to the Tyger Valley Centre in the north. The level of strategic modelling support for such a technology step change proposal suggests that this is a proposal potentially with significant regional implications.

This outcome requires that:

- A more rigorous demand modelling review, at an appropriate meso-modelling level, be undertaken to review and confirm:
  - The breach of envisaged BRT capacity thresholds along the northern corridor from the Cape Town International Airport through the Bellville node to Durbanville along:
    - the proposed T13 alignment utilising Robert Sobukwe Road / Sympathy Way to the south of the Bellville node;
    - T13 along the proposed Robert Sobukwe Road extension (North-South) and thereafter along the Willie van Schoor / Durban Road couplet and thereafter to Durbanville;
  - The demand implications associated with, and continued need for:
    - T14 along Tienie Meyer Bypass to the west of the Bellville node, and the need for its continuation to the east to link with Kraaifontein;
    - T19 along Frans Conradie and then north to Durbanville via the Willie van Schoor / Durbanville Road couplet.
  - A consideration of a light rail technology application to replace the BRT interventions within the CTIA – Bellville – Durbanville corridor with a light rail transit response supported by an appropriately designed street transit system underpinning such a technology change.
  - A consideration of extending this review of technology through to Durbanville in the north and the MSE in the south.
- In parallel the City initiates a preliminary LRT business case process to confirm the technical, financial and economic feasibility and the implications on the affected portions of the current IPTN planning;
- If the preliminary LRT business case outcome supports a further consideration of LRT, that the City confirms that the National Treasury PPP Project Cycle processes reflecting the requirements of National Treasury Regulation 16 to the PFMA will be adopted in advancing such a consideration of LRT;
- In line with the PPP Project cycle, the City initiates the development of a comprehensive business case to be undertaken to confirm, at an appropriate level of detail, the technical, financial and economic feasibilities as required by, and in conjunction with, both National Treasury and the Department of Transport;
- Should a positive outcome from the comprehensive business case materialise, to initiate all necessary Council approvals, and in conjunction with, both National Treasury and the Department of Transport, the inception phase of the PPP process.

12.2.3 Road Based Public Transport

The importance of the role of road based public transport in supporting the rejuvenation of the Bellville CBD core area over the next 10-15 years cannot be over-emphasised.

That said, it is important to recognise that the level, and quality, of services currently being provided by the mini-bus taxi industry and the current scheduled bus operations is not appropriate for supporting significant urban renewal of the Bellville node. The following is noted for consideration by the City:

- While rail services are key to the overall redevelopment of the Bellville CDB, an effective rail recovery is likely to take at least 10-15 years to materialise. Road based public transport transformation and integration (a "street transit" outcome), comprising reconfigured route networks, service and mixed fleet specifications, is required to be mobilised in a manner that facilitates the provision of an effective integrated public transport system to serve the Bellville node;
- An accelerated transformation is required of the current disparate scheduled bus services and unscheduled, informal mini-bus taxi services into a formalised and integrated "street transit system" to support both the Bellville CBD urban renewal intentions over the next 10-15 years as well as providing incremental support to the recovery of rail services. The formation of voluntary Taxi Operating Companies (TOCs) will not provide the requisite level of transformation within the time frames envisaged. This will require the City to:
    - Formally adopt a more proactive policy to the transformation acceleration of the mini-bus taxi industry, one that promotes and actively supports formal transformation through the creation of legally constituted Public Transport Companies (PTCs) which are contracted to provide integrated scheduled street transit services (feeder, local and community services) in support of the identified trunk services;
    - In support of a more proactive road based public transport transformation policy, undertake a comprehensive systems planning review to determine the appropriate community, feeder and local street transit network, service requirement and fleet mix that would be supportive of the incremental rejuvenation of the Bellville CBD core;
    - Proactively engage (negotiate with) the Mini-bus taxi industry to accelerate transformation through the provision of "street transit" subsidised contracts that are structured around optimal route networks, service specifications and appropriate mixed fleet requirements that minimise operational costs and subsidy requirements;
    - Engage with the current subsidised bus operator to provide enhanced and / or modified levels of service that respond to the optimised route networks, service specifications and mixed fleet requirements that are developed as part of the systems planning review;
    - Engage both the transformed PTCs and the subsidised bus company with a view to identifying business opportunities that would be beneficial to all parties.
- Engage with Transnet to secure / reserve land within the Transnet Site Master Plan, to support the provision of a holding area / maintenance depot facility that can be developed incrementally over time to move from a taxi / bus holding area to a more formalised road based mixed fleet maintenance depot and the potential incorporation of a LRT maintenance depot and stabling facility should this be required.

12.3 Road Proposals

The road proposals that were considered are separated into two groups:

a. Those proposals, located primarily within the primary study area ("the core area road proposals"), that improve the road network operational performance within the Bellville CBD area to facilitate a more pedestrian and public transport friendly environment;

b. Those road proposals outside of the primary study area but within the secondary area ("the extended network road proposals") that contribute a positive redistribution of traffic using roads that pass through the

Bellville CBD area while addressing a number of identified metropolitan level network issues or short-comings.

The **Core Area Road Proposals** comprise the following:

a. Robert Sobukwe Extension (north-south);

b. Carl Cronje realignment with Durban Road;

c. Frans Conradie Drive couplet reconfiguration through to Bill Bezuidenhout Avenue;

d. Maree Street upgrading and extension;

e. Tienie Meyer Extension

i. Northern alignment + the eastern portion of the southern alignment

ii. Southern (Original) alignment

f. AJ West / Church Street / Reed Street upgrading / extension

g. Willie Hofmeyer north – south extension linking Bill Bezuidenhout to Sackson Street

The **Extended Network Road Proposals** comprise the following:

a. Robert Sobukwe Extension (East / West) linking with La Belle Road;

b. Fransie van Zijl Drive Extension to Kasselsvlei Road;

c. C-D Lanes on the N1 to Carl Cronje Drive;

d. Northward Extension of Pieter Barlow Across Strand Street to link with De La Rey Ave to the east of the Stikland Site, extending along a new road on the south-eastern Stikland site boundary to Cilmor Street before linking with Old Paarl Road along with an upgraded Kopies Road on the eastern edge of the Stikland site;

e. The extension of Landros Road from Voortrekker Road in the north to Francie van Zijl Avenue in the south.

Additional Extended network level road proposals that could warrant further investigation by the City, that are noted but which have not tested within the strategic modelling that was undertaken, include:

a. The linking of Robert Sobukwe extension (east/ west) directly with the R300;

b. The inclusion of CD roads between the possible Robert Sobukwe interchange on the R300 and that Bottelary half-diamond interchange.

12.3.1 Core Area Road Proposals

The core road proposals were identified following an extensive modelling and evaluation process that highlighted the merits of the individual schemes in relieving the vehicular traffic flows through the Bellville CBD core area.

In depth consideration of the outcomes resulted in a “core group of road proposals” that collectively had a significant positive impact on traffic reduction within and through the Bellville CBD.

Conclusions relating to the individual road proposals are outlined.

a. **Robert Sobukwe (North – South) Extension**. This proposal provides a key linkage in the Bellville CBD road network, one that provides operational relief to Durban Road, Voortrekker Road, Barnard Street and Bill Bezuidenhout Avenue.

It fulfils a multi-functional role, accommodating a strong private vehicle demand, as well as a providing a more direct freight route to the N1 from the industrial areas to the south (Transnet site and Sacks Circle) for freight traffic which currently utilises the Tienie Meyer Bypass and Mike Pienaar Boulevard to access the N1.

Although the proposed extension currently does not form part of the IPTN network, there would be significant benefit to re-aligning Trunk Route 13 from Durban Road to the proposed extension, providing a more direct link to the north. That noted, it is important that the link is not prioritised as a public transport dominant route given the importance of the link in supporting both private vehicular and freight north -south movements. Two

lanes in each direction should be retained to accommodate this traffic requirement.

Operational relief along Durban Road provides opportunities for both accommodation of enhanced community / feeder public transport services as well as providing mobility support for increased development densification along Durban Road between Frans Conradie in the north and Voortrekker Road in the south.

The road reserve requirements in the vicinity of proposed BRT Stations that could be located immediately north of Voortrekker Road as well as in the vicinity of Frans Conradie Drive would require further review in terms of the potential impact on the road reserve currently in the process of being acquired.

Although approaching 80 - 90% capacity along some sections when applying end state land use outcomes, a 4-lane road should cope with general traffic demand. In future, the positive impact on Voortrekker Road is expected to become much more prominent.

b. **Carl Cronje Drive Realignment.** This road proposal forms an integral part of the Robert Sobukwe (North / South) extension proposal, aligning with Durban Road to the south of the N1 through the Frans Conradie Drive intersection. It provides a secondary direct north-south network link between the Bellville CBD and areas adjacent to Carl Cronje Drive to the north of the N1.

c. **Frans Conradie Couplet Reconfiguration**. The consolidation of the current couplet arrangement extending from the envisaged Robert Sobukwe extension through to Bill Bezuidenhout Avenue will strengthen the linkage from the Durban Road / Robert Sobukwe Road node through to Bill Bezuidenhout Drive. It supports the enhancement of a major east- west arterial south of the N1. The End State results show fairly high (AM) westbound traffic volumes, approaching the peak hour capacity of this arrangement.

d. **Maree Street**. This road proposal provides an alternative route to Voortrekker Road for circumventing the CBD which has been compromised, from a private vehicle mobility perspective, by the pedestrianisation interventions that have occurred historically. The introduction of an upgraded Maree Street facility will allow Voortrekker Road to become a more focused pedestrian and public transport facility.

The proposed realignment and upgrading of Maree Street extends from Durban Road in the west to Bill Bezuidenhout Avenue and Old Paarl Road to the east. The proposed new alignment of Maree Street will enable the extension of a duelled carriageway Old Paarl Road from Brackenfell through to Durban Road.

Both the 2018 and End State model runs show that the Maree Street upgrading and eastern extension is a logical network improvement in terms of the overall development objectives for the Bellville CBD re-vitalisation initiatives.

The extension of Maree Street further to the west beyond Durban Road does not appear to be warranted.

The Maree Street proposal requires significant intervention given that its function will materially change and that the current road reserve is not sufficient to accommodate the envisaged improvements and re-alignment, requiring a substantial acquisition of properties along its length.

The 1998 Preliminary Design Report proposals advocates a WCG Class E(ii) Municipal Cross-section with 2,0m (preferably 2,4m) sidewalks along its length.

Given the changed focus towards pedestrian movement supported by a more comprehensive public transport service provision, this arrangement would warrant review, noting that the modelling indicates that 4-lane dual carriageway cross section should provide sufficient capacity for the anticipated peak hour traffic demand

e. **Tienie Meyer By-Pass Extension.** The review of this proposal has indicated two alignments that would require further consideration.

i. The **original southern alignment**, for which a ROW exists (although compromised in two locations along its length), moves eastwards from Robert Sobukwe before aligning southwards across the eastern railway line approaches to Bellville Station, to link with Peter Barlow Street and, shortly thereafter, with Strand Road. This alignment provides limited relief for a portion of Strand Road between Belrail Road and the new connection to the Tienie Meyer By-pass. It accommodates a significant redistribution of traffic primarily from Voortrekker, Belrail and Kasselsvlei Roads.

   The 2018 as well as the End State modelling results show a large redistribution of traffic from existing east-west routes onto this important missing link in the network

ii. The **northern alignment** continues eastwards from Robert Sobukwe Road along Suid Street / Belrail Road before linking with Strand Road to the east. This proposal allows consideration of an extended connection beyond Strand Road to link with the Stikland site and ultimately with Old Paarl Road.

   The End State modelling scenario includes the Stikland development and the further extension of Tienie Meyer to Old Paarl Road. Traffic along this route is expected to increase significantly in response to this long-term scenario, reaching capacity between Robert Sobukwe Road and Voortrekker Road westwards during the AM peak hour.

   The results also show a potential redistribution of traffic from Old Paarl Road onto this new orbital corridor. The volume/ capacity figures indicate that it may not be possible to develop the Stikland site without this new route.

   The proposal will require a review of the land take requirements (expropriations) as well as a consideration of a connection with any southern extension of Willie Hofmeyer Avenue to join Sackson Street south of the railway lines in addition to an evaluation of at-grade and grade separated interfaces with Strand Road.

   The role that Willie Hofmeyer Avenue plays in supporting both of these alignments cannot be under-estimated.

   While both proposals have differing merits, a final outcome and recommendation would only be possible following a more detailed feasibility and economic analysis of the three proposals.

f. **Willie Hofmeyer Avenue.** A review of the broader primary and secondary study area road network configuration and spacing, highlighted gaps in the road network configuration and provision around the Bellville CBD. One such gap (although reflected in the City of Cape Town 1979 Roads Master Plan, it has been omitted from more recent editions of the plan) was a north-south link extending Bill Bezuidenhout Avenue southwards along Willie Hofmeyer to cross Belrail Road / Tienie Meyer By-Pass extension to link with Sackson Street south of the Transnet / PRASA railway lines.

   Although not tested for technical feasibility, the modelling outcomes reflect an underlying requirement for such a link, confirming the need for this important missing link in the metropolitan network. The value of such a link is strongly reinforced when considered as part of the combined core area road proposals for the envisaged end state land use.

g. **Tienie Meyer Southern Industrial Connection**. With the extension of Willie Hofmeyer Avenue southwards, the opportunity presents itself to construct an internal industrial access road linking Willie Meyer to the west to Peter Barlow / Strand Street to the east. This link provides an additional east-west link that distributes traffic towards Strand Street, allowing a measure of relief to the Strand Street / Tienie Meyer northern links.

h. **AJ West / Church / Reed Streets.** In the absence of the Tienie Meyer By-Pass extension and Willie Hofmeyer Avenue proposals for the Core Area, this link plays a relatively significant role in providing “internal access” to development between Voortrekker Road and the existing Tienie Meyer By-pass for the areas extending from Landros Road to the west to Willie Hofmeyer to the east.

Within the context of the Core Area Road proposals, the significance of this link varies depending on the combination of core area road proposals applied.

In terms of supporting development between Landros Street in the west to Robert Sobukwe Road in the east, the AJ West / Church Street Link retains a relevance for internal access and modest traffic distribution once the development of the Paint City and the current PTI sites are developed;

With the northern alignment of the Tienie Meyer By-Pass Extension, Belrail Road diminishes in role and function, while Reed Street (extended through the Sanlam site to connect to Willie Hofmeyer Avenue) assumes an important access role for development potential between Robert Sobukwe Road to the west and Willie Hofmeyer Avenue to the east.

With the southern (original) alignment of Tienie Meyer By-Pass extension, Belrail Road assumes a significant connectivity role between Robert Sobukwe Road to the west and the Stikland site and Old Paarl Road to the east. The role of Reed Street is significantly diminished through the Sanlam site with this scenario, potentially obviating the need for such a link, while providing a level of local access to the western development parcels that links to a left-in / left-out arrangement on Robert Sobukwe Road.

12.3.2 Policy Informed Road Design

Historically much road capacity provision has been informed by the need to meet the demands for increased private car travel and that of minimising congestion levels experienced on the urban road network.

Incrementally this has contributed to the deterioration of what were once viable scheduled public transport operations, and increased risks associated with walking and bicycling, particularly so at places of employment and schools.

Road design guidelines & standards have, and still do, reflect predominantly on ‘roadway’ rather than ‘complete street’ design.

If it is the intention to bring about meaningful urban and socio-economic transformation within the Bellville CBD, then the role of public transport, with associated non-motorised transport, is a catalytic intervention mechanism.

This needs to be supported by a different approach to the design of roads that reflects the better accommodation of the range of person and goods travel demands with increased road productivity.

This suggests that the application of re-considered road design standards that are ‘context sensitive’ reflecting a ‘complete street’ design philosophy. These “context sensitive” guidelines should respond to the development environment within which the road exists noting the desired functionality required and the need for the application of appropriate and applicable attributes and design standards.

This is achievable through the adoption of recently published international best practice guidelines, and recognition that there is a need for adjustments to be made to locally available design guidelines, which in some respects are now dated.

12.3.3 Overall Summary or the Core Area Road Proposals

The introduction of this set of road proposals has a positive impact on traffic reduction within the CBD core area. Specifically, traffic along Durban Road, Voortrekker Road, Church Street, Belrail Road and Robert Sobukwe Road is reduced.

The introduction of Robert Sobukwe Road (north-south) extension has a material impact on the north-south traffic movement attracting significant vehicle volumes during the peak hour. Together with the Maree Street extension, these two proposals are a major contributor to traffic reduction on Durban Road and Voortrekker Road as well as the minor north-south links to the east.

Robert Sobukwe Road (north-south) should accommodate public transport, freight transport and private transport movements in a balanced manner.

The introduction of the Willie Meyer north-south link from Bill Bezuidenhout / Maree Street to Sackson Street and beyond to Kasselsvlei Road and then on

to Robert Sobukwe Road (East-West) has a significant impact on traffic distribution to the east of the CBD core area.

12.3.4 Extended Network Road Proposals

These proposals have been modelled individually to assess the high-level implications of the road proposal introduction into the broader network and to assess potential influences on the Bellville CBD core.

In most cases, their impact on the CBD core is marginal or negligible yet they do fulfil a broader role in the wider road network that needs to be taken into account particularly where they interface with key core road proposals such a Tienie Meyer By-pass extension and the Robert Sobukwe Road (east – west) extension to La Belle Road. They have also been modelled collectively with embedded core area road proposals.

a. Carl Cronje Half-Diamond Interchange

The introduction of the Carl Cronje half-diamond interchange with the linked C-D roads from Jip de Jager interchange to Carl Cronje Drive has the effect of relieving traffic along the N1 in both directions. It also realises a significant reduction in traffic in both directions along Frans Conradie Drive between Mike Pienaar Boulevard and the proposed re-aligned Carl Cronje intersection with Durban Road.

The introduction of this proposal has a marginal positive effect on traffic distribution through the Bellville CBD.

b. Fransie van Zijl Drive Extension

This proposal provides a much-needed east-west linkage across the Transnet Site between the Tienie Meyer By-Pass and Robert Sobukwe Road (East-West link). The proposal, as currently envisaged, would traverse the current substantial operational areas associated with Transnet Freight Rail activities and the proposed 'back-of-Port" operations, to link with Kasselsvlei Road to the east of the Site.

The proposal lends itself to providing east west linkage opportunities that relieve the Bellville CBD of unnecessary through traffic.

In the event that Transnet favourably considers suggestions from the City of Cape Town for a consideration of on-site operational optimisation that locates the TFR freight and "back-of-port" operations to the south to the proposed road linkage and a consideration of mixed use development of the northern portion of the site immediately south of Bellville Station, this proposal will fulfil a dual function of accommodating east-west through traffic while providing access to the mixed use development situated immediately to the north of it and freight activities to the south of it.

The macro-modelling outcome highlights the important role that such a link would play in reducing traffic through the CBD area but the final informant and determinant will be Transnet's final approved Master Plan for the site and the strategic decisions that are taken regarding its core operations and the associated core and non-core assets required to support the core operations.

c. Landros Road Extension

The review of the road system configuration and spacing surrounding the Bellville CBD core area, highlighted two "gaps" related to north-south linkages in the road network through the primary study area. Landros Road extension is the second missing north-south link identified, if it is accepted by all affected parties, that the mixed use redevelopment of the northern portion of the Transnet site between the railway lines to the north and the proposed Francie van Zijl Drive extension to the south is a viable land use response.

This extension would also be supportive of any envisaged re-development (still to be confirmed) of the Tygerberg Hospital site as a mixed use development.

The envisaged link would need to traverse both the existing rail lines (in addition to any envisaged expansion of the passenger rail lines from Bellville Station to Cape Town) and any additional rail lines to support "back-of-port" operations. It would also need to negotiate an environmentally sensitive area within an identified "green lung".

Two options were considered; the first extended Landros Road to link with Robert Sobukwe Road in the south and the second was a truncated extension that linked with the existing Fransie van Zijl Drive.

The proposed option of linking to Robert Sobukwe Road in the south would draw traffic from both Robert Sobukwe Road in the east as well as reducing the levels of traffic on Tienie Meyer By-Pass to the west and south.

Should mixed use development to the south of Belville Station materialise then access would need to be considered from both the east (Robert Sobukwe Road) and to the west (Landros Road Extension).

d. Robert Sobukwe Road (East-West) Extension to La Belle Road

The extension of Robert Sobukwe Road Extension to La Belle Road completes a critical east-west network link drawing traffic from both Robert Sobukwe Road (North-South) as well as from Peter Barlow Road.

The implications for freight traffic re-routing cannot be underestimated noting the high level of freight movement that currently makes use of Robert Sobukwe Road – Tienie Meyer By-Pass and Mike Pienaar Boulevard to access the N1.

The proposed alignment necessitates the crossing of the Bellville – Strand railway line (including provision for a possible quadrupling of lines to accommodate future rail planning). In addition, it would also be required to cross the operational loop link between the Strand and the Serepta railway lines. This would entail a significant road-over-rail bridge requirement unless PRASA could concede the necessity for retention of the loop line in which case the bridge requirement would be materially reduced.

The conceptual design for this proposal would clarify the outstanding issues that require resolution to enable this proposal to be advanced.

e. Stikland Hospital Site Supporting Road Proposals

The extension of either (i) the Tienie Meyer By-Pass by way of the northern alignment, or the extension of the Belrail Road in the event of a southern alignment for the Tienie Meyer By-Pass extension road, would need to consider a new facility from Strand Road to an intersection with Cilmore Road before continuing to link, on the eastern edge of the site, to Old Paarl Road to the north. De le Hay Avenue would require upgrading between this new link and Old Paarl Road.

These road elements attract a moderate level of traffic making this connection(s) worthy of further consideration to establish the technical implications of the Cilmore linkage once clarity is obtained regarding the final intentions for the Stikland site.

12.3.5 Overall Summary of the Combined Core & Extended Network Road Proposals

The outcome of the combined Core Area and Extended Network Road Proposal interventions is a material reduction in traffic associated with the Belville CBD and significant traffic relief along Frans Conradie Drive, Durban Road south of the N1, Voortrekker Road, Robert Sobukwe Road south of the CBD as well as along Pieter Barlow Road and the N1.

This reduction in traffic within the CBD core area supports the intentions to provide a movement environment within the core area that is pedestrian friendly and one that facilitates a better organisation of road based public transport service responses.

12.3.6 Urban Renewal

Urban renewal covers a spectrum of interventions. Key to these are formalised joint planning and development agreements being concluded with PRASA and Transnet regarding the joint planning and development of land associated with the Belville CBD. These agreements should clearly deal with funding availability and agreement on which parties take responsibility for advancing the development intentions that have been identified.

The relationship with tertiary educational institutions requires formalisation within the context of developing the Bellville economic node as a world class “knowledge and innovation hub”.

The City needs to facilitate a more proactive and focused “repurposing” of, firstly, its own property asset base to leverage asset value, and secondly to facilitate provincial and national support for such a repurposing of other state owned assets to leverage asset value that achieves the renewal objectives associated with the Bellville node as well as re-instilling private sector investor confidence.

13. Recommendations

13.1 Land Use

The following land use recommendations are outlined:

a. The end state land use assumptions be accepted for the purposes of this study;

b. For simplicity, four density ranges are considered, relating to the "accessibility" requirements of particular urban locations to support the provision of public transport:

   i. highly accessible localities adjacent to public transport interchanges should be between 80-100du/ha 200pph - 250pph (with an average household size of 2,5 persons / ha);

   ii. Accessible localities adjacent to development corridors should be between 60-80 du/ha (150pph – 200pph);

   iii. Within localities located 1 km walking distance from a corridor should be between 40-60 du/ha (100 – 150pph); and

   iv. Within localities with densities <40 du /ha (<100pph), which require **specified public transport policy responses** (hourly frequencies, hours of operation) to support feeder services to nearby corridors and / or local or community services providing community access to community facilities (clinics, libraries, government facilities). Sight should not be lost of the fact that these services also provide access to domestic employees, who are often neglected in any consideration of public transport provision.

c. The City formerly engages with Transnet regarding the finalisation of the Transnet Site Master Plan – seeking assurances that the resultant land uses proposed are compatible with existing and proposed adjacent land uses.

13.2 Public Transport

13.2.1 Urban Passenger Rail

1. Given the progressive decline of urban passenger rail services over the past ten years within the Cape Metropolitan area, the City to engage with PRASA and the Department of Transport to request clarity on, and assurances relating to:

   - Bringing about passenger rail service re-instatement ("service recovery") and time frames associated with the northern operating corridor to levels of service experienced at the time of the formation of PRASA in 2009; noting that such a minimum level of rail service recovery requirement would be some 12-15 trains per hour between Bellville and Cape Town providing a peak practical corridor capacity of at least 25 000 passengers / hour;
   - PRASA's ability, with the introduction of new generation rolling stock, a modernised signalling system, and a progressively modernised infrastructure base, to deliver a corridor practical carrying capacity of at least 45 000 passengers per hour with enhanced levels of service that would be supportive of the incremental redevelopment of the Bellville node;
   - The strategic passenger rail network expansion intentions and associated time frames to accommodate envisaged rail network development along the Bellville – Strand corridor (quadrupling, including the incorporation of the Blue Downs line), the Bellville – Kraaifontein corridor (quadrupling jointly with Transnet Freight Rail) and along the Bellville – Cape Town corridor (4th line) requires clarification and confirmation to inform the PTI deck and Bellville Station air-rights development Master Plan.

2. The City to ensure that the current northern corridor modernisation study being undertaken by the City, confirms realistic timelines associated with each of the above interventions that will bring clarity as

to the urban rail renewal and modernisation delivery time frames and the associated implications for the Bellville CBD revitalisation.

3. Prepare joint planning and development agreements and protocols with PRASA regarding the redevelopment of the Bellville Station precinct.
4. Undertake, jointly with PRASA, the development of a Bellville Station Precinct Air-Rights Development Master Plan incorporating any, and all, urban rail strategic network planning initiatives that would inform the Master Plan footprint.
5. A confirmation from Transnet regarding intentions to address "back of port" freight operations support location and freight rail infrastructure requirements to inform the finalisation of the Bellville Station air rights development Master Plan (inclusive of the PTI ("mobility hub") precinct footprint) as well as the location and feasibility of a public transport holding area / maintenance depot facilities within the northern Transnet Site precinct.

13.2.2 Light Rail

The City considers undertaking:

6. A more rigorous demand modelling review, at an appropriate meso-modelling level, be undertaken to review and confirm the breach of envisaged BRT capacity thresholds along the northern corridor from the Cape Town International Airport through the Bellville node to Durbanville.
7. If the preliminary LRT business case outcome supports a further consideration of LRT, that the City confirms that the National Treasury PPP Project Cycle processes reflecting the requirements of National Treasury Regulation 16 to the PFMA will be adopted in advancing such a consideration of LRT.
8. In line with the PPP Project cycle, the City initiates the development of a comprehensive business case be undertaken to confirm, at an appropriate level of detail, the technical, financial and economic feasibilities as required by National Treasury regulations.
9. Should a positive outcome from the comprehensive business case materialise, to initiate all necessary Council approvals, and in conjunction with both National Treasury and the Department of Transport, register the inception phase of such a LRT PPP process.

13.3 Road Based Public Transport

Recognising

That the level, and quality, of road based public transport services currently being provided by the mini-bus taxi industry and the current scheduled bus operations are not appropriate for supporting significant urban renewal of the Bellville node;

Acknowledging

That an accelerated transformation is required of the current disparate scheduled bus services and unscheduled, informal mini-bus taxi services into a formalised and integrated "street transit system" to support both the Bellville CBD urban renewal intentions over the next ten years as well as providing incremental support to the recovery of rail services; and

Noting

that the formation of voluntary Taxi Operating Companies (TOCs) will not provide the requisite level of transformation within the time frames envisaged to bring about urban renewal and re-instil investor confidence;

the City of Cape Town should:

1. formally adopt a more proactive policy to the transformation acceleration of the mini-bus taxi industry, one that promotes and actively supports formal transformation through the creation of legally constituted Public Transport Companies (PTCs) which are contracted to provide integrated scheduled street transit services

(feeder, local and community services) in support of the identified trunk services;

2. undertake a comprehensive systems planning review to determine the appropriate street transit network, service requirement and fleet mix that would be supportive of the incremental rejuvenation of the Bellville CBD core and provide a base for engagement with the mini-bus taxi industry regarding transformation;
3. proactively engage (negotiate with) the Mini-bus taxi industry to accelerate transformation through the provision of "street transit" subsidised contracts that are structured around optimal route networks, service specifications and appropriate mixed fleet requirements that minimise operational costs and subsidy requirements;
4. Engage with the current subsidised bus operator to provide enhanced and / or modified levels of service that respond to the optimised route networks, service specifications and mixed fleet requirements that are developed as part of the systems planning review.

13.4 Urban Renewal

Recommendations include:

The City of Cape should give consideration to:

- the initiation of precinct planning for the Middestad / Paint City precinct / Northern Station Forecourt precinct;
  - This would require the appointment of an urban designer and architect;
- Concluding appropriate joint planning and development agreements and protocols for the redevelopment of the Bellville Station as an overhead station integrated with a proposed public transport interchanged (future proofed to be a mobility hub) and station forecourt precincts to the north and south of the station precinct;
- Ensuring that, as part of the development agreements concluded with PRASA, provision is made to consider the outright purchase of the current development lease associated with the Belstar Shopping Centre or that an appropriate relocation agreement is concluded for the Belstar centre to relocate to a new location in the modernised overhead station precinct;
- Formally engaging with Transnet, through its Transnet Site Master Plan process, to optimise freight rail and back-of-port operations support to the south of the Transnet site, thereby releasing land to the north of the site to be released for mixed use development in support of the Bellville CBD densification intentions.

13.5 Road Proposals

1. The road proposals comprising the core road proposals be accepted as the network improvement package to support the economic renewal of the Bellville CBD node, the associated pedestrianisation of the area and public transport servicing the area. These road proposals are all key proposals that should be advanced through the design phases simultaneously with implementation informed by the design process outcomes associated with technical feasibility, land assembly, public consultation processes and budget availability.
2. For each road proposal the following is recommended:
   a. **Robert Sobukwe Extension (N/S) / Carl Cronje Re-alignment / Frans Conradie Extension**
      i. The conceptual planning of Robert Sobukwe Extension be reviewed to accommodate a cross-section comprising two lanes of general traffic in each direction, a basic BRT system with passing lanes at two stations proposed at Voortrekker Road and at Frans Conradie Drive;
      ii. The conceptual planning of the re-alignment of Carl Cronje with Durban Road be reviewed, noting the possibility of

incorporating a possible LRT alignment within this alignment;

iii. The conceptual planning for Frans Conradie extension be undertaken;

iv. The confirmation of the land requirements to accommodate the Robert Sobukwe Extension cross-section, the re-alignment of Carl Cronje and the extension of Frans Conradie for land assembly;

v. The necessary public consultation processes be revisited / initiated in the light of the new requirements;

vi. The City continue with the process of land assembly on all three schemes;

vii. Detailed design be undertaken to contract documentation stage either individually or collectively;

viii. The City to program implementation subject to budget allocation.

b. Tienie Meyer Extension (Northern / Southern Alignments)

i. The conceptual planning of Tienie Meyer Extension be reviewed to assess the technical and financial feasibility of both the northern alignment as well as the southern alignment. A preferred alternative to be recommended;

ii. The confirmation of the land requirements for the preferred alignment be confirmed;

iii. The necessary public consultation processes be revisited / initiated for the preferred alignment;

iv. Land assembly (or right of way securitisation) be undertaken;

v. Detailed design be initiated to contract documentation stage either individually or collectively;

vi. The City to program implementation of the preferred alignment subject to budget allocation.

c. Willie Hofmeyer Avenue Extension

i. The conceptual planning of the Willie Hofmeyer Avenue Extension be undertaken to assess the technical and financial feasibility associated with the southern extension-specific attention is required with the connections to the preferred alignment of Tienie Meyer Extension;

ii. The confirmation of the land requirements for the preferred alignment be confirmed;

iii. The necessary public consultation processes be revisited / initiated for the preferred alignment;

iv. Land assembly (or right of way securitisation) be undertaken;

v. Detailed design be initiated to contract documentation stage;

vi. The City to program implementation of the preferred alignment subject to budget allocation.

d. Maree Street Extension

i. The conceptual planning of the Maree Street Extension be reviewed to assess the cross-section and land assembly implications associated with a changed function;

ii. The confirmation of the land requirements for the preferred alignment be confirmed;

iii. The necessary public consultation processes be revisited / initiated for the preferred alignment;

iv. Land assembly (or right of way securitisation) be undertaken;

v. Detailed design be initiated to contract documentation stage;

vi. The City to program implementation of the preferred alignment subject to budget allocation.

3. The Extended network package of road proposals be reviewed and updated, as appropriate, as part of a broader metropolitan road network review.

13.6 Policy Informed Road Design

Consideration be given to:

- "context sensitive" guidelines that respond to the development environment within which a road exists noting the desired functionality required and the need for the application of appropriate and applicable attributes and design standards;
- the application of re-considered road design standards that are 'context sensitive' reflecting a 'complete street' design philosophy;
- Achieving this re-consideration through the adoption of recently published international best practice guidelines, and recognising that there is a need for adjustments to be made to locally available design guidelines, which in some respects are now dated.

13.7 Parking and Loading

The following be considered:

- The declaration of the area as PT2 Zone, where it is permitted that on-site parking should not exceed the Town Planning requirement for such a zone;
- The declaration of an outer band as a PT1 Zone, where the parking requirement falls between the prescribed levels;
- The removal, as far as possible, of all on-street parking within the declared areas, and on all Class 3 & 2 roads within the study area;
- The provision of public accessible parking (on-street or lots) for which parking is charged. This to be based on an annually reviewed supply & demand assessment that ensures turnover & the ready availability of a limited percentage;
- The provision of access to any public parking area will avoid passing through pedestrian dominated areas.

14. References

1. Bellville Tyger Valley Area - Transport Master Plan. Dec 2018. Final Report. Stellenbosch University
2. Bellville Land Use Master Plan & Preliminary Feasibility Study. Unknown date. Draft Report. Transnet Freight Rail
3. Bellville CBD Development Framework. July 1999. First Draft. City of Cape Town
4. TOD Opportunities investigation for the Bellville Station Precinct. April 2016. Final Draft Report. City of cape Town
5. Bellville Integrated Transport and Land Use Plan. March 2016. Final Draft. City of Cape Town
6. Tygerberg District Plan. 2012. Final Draft. City of Cape Town
7. Spatial Development Framework – Bellville Transport Interchange. August 2000. City of Tygerberg
8. Urban Accelerator: Bellville Opportunity Area – Workshop minutes Report. March 2017. Final Workshop Minutes Report. City of Cape Town
9. Transformation of the Bellville Public Transport Interchange – Conceptual Design Report. March 2016. Final Report. City of Cape Town
10. Bellville Transport Interchange Upgrade. June 2013.
11. Transformation of the Bellville Public Transport Interchange. March 2016. Final Conceptual Design Report. City of Cape Town
12. Comprehensive Integrated Transport Plan 2017-2022
13. TDA, IPTN 2032, Implementation Pan (v3), 2017
14. TCT, Integrated Public Transport Network Plan 2032, 2014

APPENDIX 1 - 5

Appendix 1 – Land Use End State Traffic Zone Information

Appendix 2 - Long term “end state” optimal density for each transport zone

Appendix 3 – 2018 EMME Road Modelling

Appendix 4 – End State EMME Road Modelling

Appendix 5 - Public Transort EMME Modelling

Document prepared by

Aurecon South Africa (Pty) Ltd
Reg No 1977/003711/07

Aurecon Centre
1 Century City Drive
Waterford Precinct
Century City
Cape Town 7441

PO Box 494
Cape Town 8000
South Africa

T +27 21 526 9400
F +27 21 526 9500
E capetown@aurecongroup.com
W aurecongroup.com

aurecon

Bringing ideas to life

Aurecon offices are located in:
Angola, Australia, Botswana, China, Ghana, Hong Kong, Indonesia, Kenya, Lesotho, Macau, Mozambique, Namibia, New Zealand, Nigeria, Philippines, Qatar, Singapore, South Africa, Swaziland, Tanzania, Thailand, Uganda, United Arab Emirates, Vietnam.